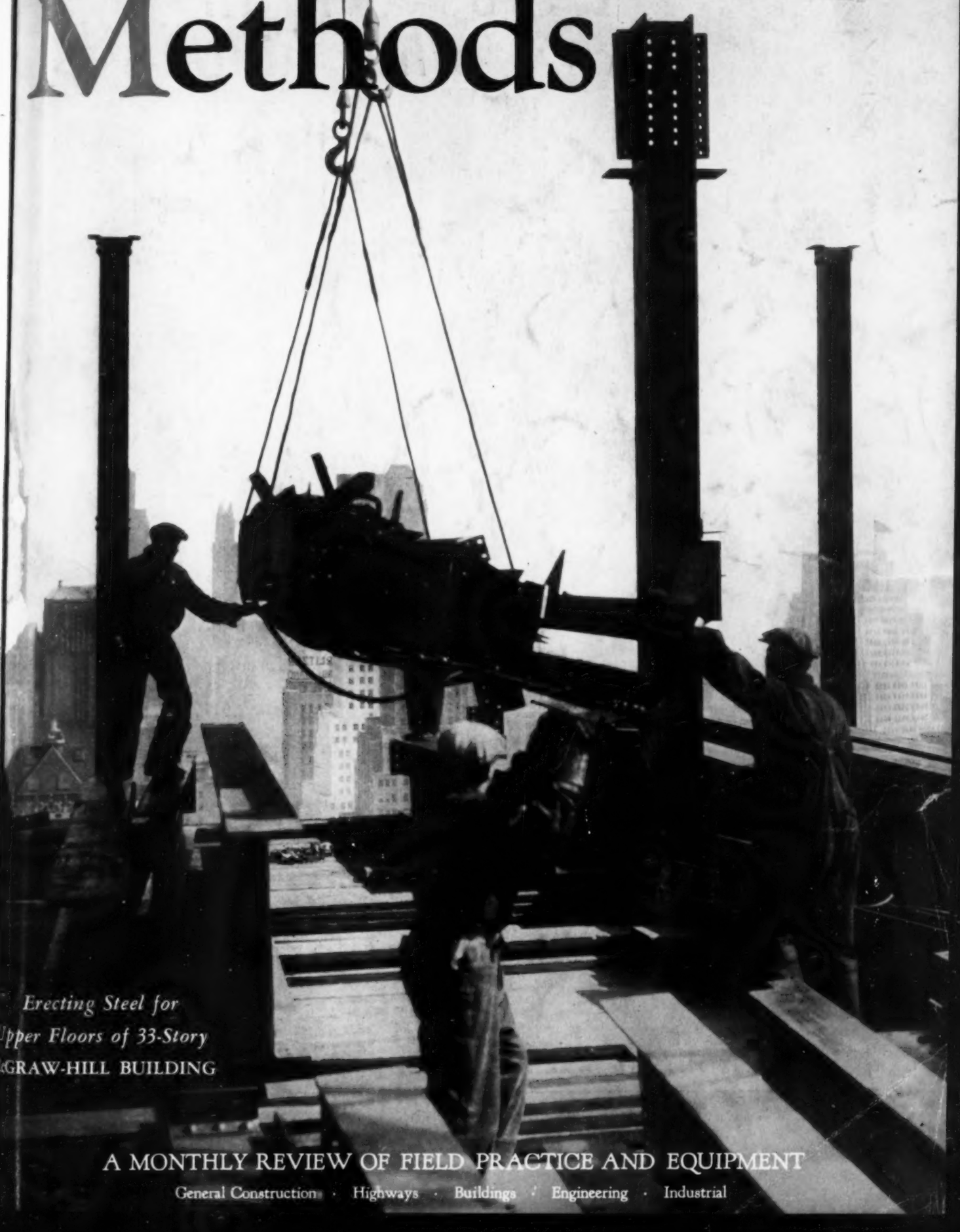
First Copy

June
1931

Construction Methods



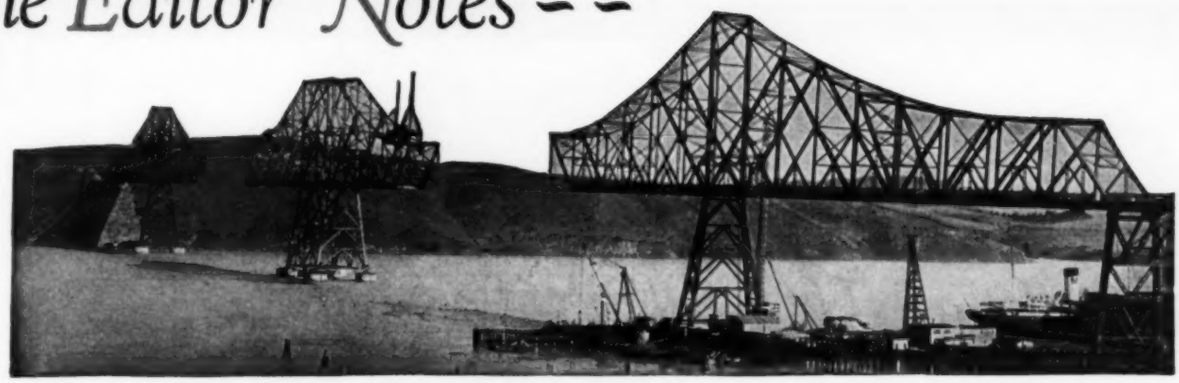
Erecting Steel for
Upper Floors of 33-Story
GRAW-HILL BUILDING

A MONTHLY REVIEW OF FIELD PRACTICE AND EQUIPMENT

General Construction · Highways · Buildings · Engineering · Industrial

CONSTRUCTION METHODS, June, 1931. Vol. 13, No. 6. Published monthly. McGraw-Hill Publishing Company, Inc., Tenth Avenue at Thirty-sixth Street, New York, N. Y. $1 per year; 10 cents per copy. Entered as second-class matter, October, 1926 issue, Vol. 8, No. 19, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A.

The Editor Notes - -



Largest Order for Drill Steel

FOLLOWING on the heels of the huge air compressor contract for Hoover dam construction entered into by Six Companies, Inc., and reported on this page last month, comes the announcement of what is claimed to be the largest order for rock drill steel ever placed for a construction project. With the "Big Six" group of contractors the Crucible Steel Company of America has agreed to supply approximately 1,000 tons of drill steel for use mainly in driving the four 57-ft. diameter tunnels, each 4,000 ft. long, that will serve as diversion and spillway conduits at the Hoover dam-site. To the construction industry evidence that contract quantities in the successful $49,000,000 Hoover dam bid are rapidly being translated into huge orders for equipment and materials comes as a cheerful stimulant.

◆

Four-Lane Pavements

In a recent annual report the Rhode Island Board of Public Roads, of which George H. Henderson is chief engineer, emphasizes the need for wider roads and offers some pertinent comment on three-lane and four-lane pavements. For moderately heavy traffic in two directions the three-lane pavement is characterized as impractical and unsafe. "If the preponderance of traffic is in one direction," says the report, "the three-lane pavement can be very efficient. In cases where there is heavy traffic in both directions, however, the middle lane merely acts to separate the traffic, as no one except the very bold driver dares to presume to use it. We have watched traffic by the hour on one of these roads and have often observed that when a driver traveling in one direction pulls out to pass another machine it is almost certain that a driver will pull out of the line traveling in the opposite direction and they are both forced to turn back into line to avoid a collision."

With the density of traffic that exists in Rhode Island, the highway department does not feel that three-lane pavements are safe for travel or that the slight additional facility which they would offer traffic would justify their construction as a fixed policy. A study of conditions leads to the conclusion that future traffic will warrant at least four-lane pavements in the reconstruction of many main arteries.

CONSTRUCTION METHODS

A monthly review of modern construction practice and equipment

ROBERT K. TOMLIN, *Editor*

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J. I. BALLARD (San Francisco)

WILLARD CHEVALIER, *Publishing Director*

A McGraw-Hill Publication

Tenth Avenue at 36th Street, New York

◆

A New Hazard

Electric-welding has introduced a new kind of hazard into construction work. The National Safety Council calls attention to the need of warning welders on steel buildings against the practice of knocking short electrodes out of their holders and allowing them to fall to the ground. The electrodes are hot and have started several fires. A more important danger, however, is that these pieces of metal, generally about 5 in. long, may strike men at work below the story on which welding is being done.

◆

Wider Scope for Welding

Eighty-four cities and towns in the United States made provisions last year, according to a review by the General Electric Co., whereby their building commissioners may permit welded construction.

Inspectors' Salaries

EFFORTS to raise the standard of inspectors on construction work by offering salaries attractive to experienced men have met with small success. Owners, engineers and contractors agree that the result would be worth while, but the old and inadequate payroll figures for inspectors still persist.

In some respects, quality of job inspection has advanced materially in the last twenty years. More thorough technical training of the young engineer equips him to grasp specifications and to enforce strict adherence to them. His employers may consider this knowledge sufficient for the capable discharge of his duties. But the young man without a background of experience is unable to appreciate construction problems. He has no store of knowledge upon which to draw for comparison and guidance. Under such a handicap, he is generally forbidden to make any decision requiring judgment. Such decisions are reserved for the engineer in charge, who may visit the work only once a day or even less frequently. When unexpected situations arise, as they inevitably do, the inspector can give final approval to no solution offered by the contractor.

With thousands of dollars invested in equipment on the job and with a payroll running into hundreds of dollars each day, the contractor must either change his program to tide over the emergency until an official decision can be rendered or apply a plan of his own, hoping that it will be approved. Either course causes uncertainty, delay, and inefficiency. As the net result, money is spent unnecessarily.

The evils of indecision and delay are attributable in large measure to lack of practical experience by job supervisors. Employment of experienced men would remove the distrust and uncertainty.

The first step in obtaining men of high caliber for inspection work is the payment of adequate salaries.

They Sell Performance

IN describing the sales organization of the construction industry, one of the leading manufacturers of equipment has said:

> "The successful distributor of today is not a catalog salesman. Many of them have had engineering and construction training, enabling them to talk the language of the engineer or contractor and to think with him in solving his problems."

This same manufacturer points out the result of this development of the distributor in these words:

> "The last fifteen years has seen a remarkable growth in the size, dependability and responsibility of the distributing organizations, many of them frequently doing a gross business in excess of some of their principals. This volume has made possible the warehouse facilities, service repair parts stocks, new stocks of complete units for prompt delivery, 24-hour service organization, and the credit and financial responsibility that are common today. Of the large group acting as the intermediary between the manufacturer and the customer, it is doubtful if there were a dozen in the country fifteen years ago capable of rendering the service now avaliable."

All this is in line with modern sales policy. The progressive manufacturer has learned that it calls for something other than just "high-pressure selling." It requires an honest product, soundly designed to meet a real need, intelligent advertising that will tie the product closely to the need in the mind of the user and a sales organization competent to see the product through from its first bow to a record of satisfactory performance.

Construction Methods is glad to have a part in this essential process and to take its place alongside the distributor, whose function is so well set forth in the foregoing paragraph.

Willard Chevalier

Publishing Director

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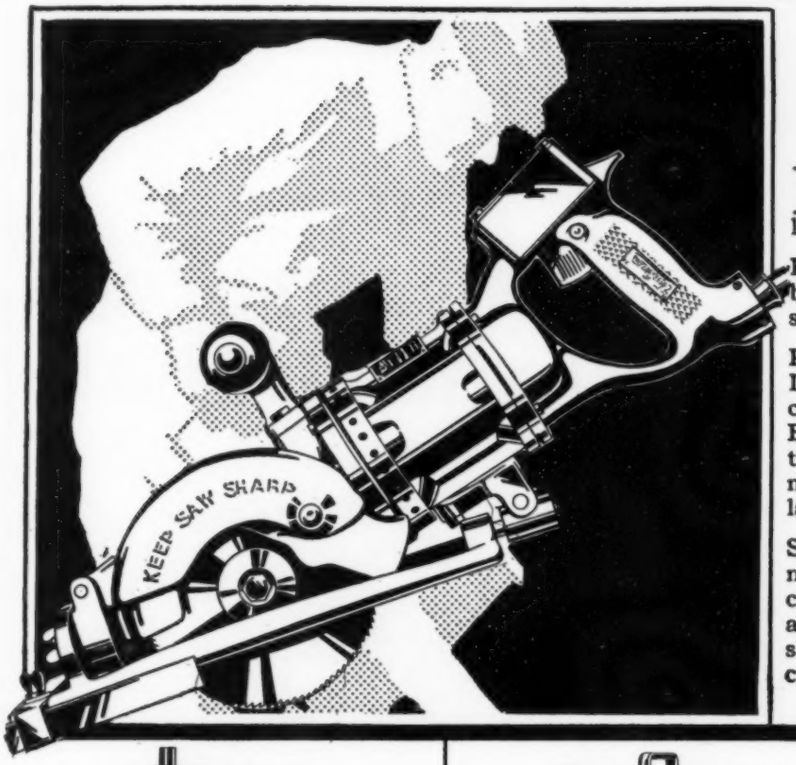
Use "Van Dorn" Portable Electric Tools for Fast, Dependable Work



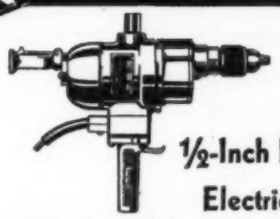
Van Dorn Electric Saws Are Six Times as Fast!

HERE is a Portable Electric Saw that is ideal for all types of building work, large construction jobs, repair work, etc.

Built in three sizes—6″, 8″ and 10″—ball bearings throughout, with chrome nickel shafts and gears.

Powerful Universal Motors use A. C. or D. C. Table adjustable for 0° to 45° bevel cutting and other special sawing operations. By using the proper blade or abrasive disc these saws will also cut light metal, slate, marble, asbestos, tile, transite and porcelain.

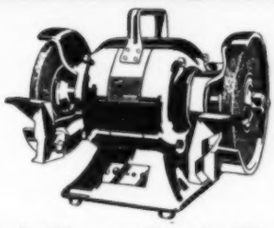
Special safety features include an automatic telescoping guard. Complete with combination rip and cross-cut blade, adjustable saw fence, three-conductor cable with safety wire for grounding, and convenient carrying case with handle.



½-Inch Portable Electric Drill

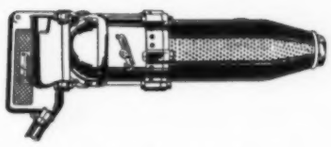
Designed and built for hard, constant use, the Van Dorn ½ inch Drill is widely used in construction work. Weighs only 12½ pounds. Very easy to handle yet extremely powerful. Great power plus low spindle speed makes this an ideal tool for all general construction drilling up to ½ inch. Universal motor operates on A. C. or D. C.

Other Van Dorn Drills are available in sizes from ¼ inch to 1½ inch—for every drilling operation.



6-Inch Electric Bench Grinder

A powerful, sturdy grinder, perfectly suited to general grinding, buffing and tool sharpening. Finely balanced construction eliminates vibration and reduces wheel wear. Conveniently portable. Complete with coarse and fine grinding wheels, tool rests, cable, attachment plug, electric switch and special rubber feet. 7″ and 10″ Grinders also available.



Fast Portable Electric Hammers

Sturdily made and very powerful, yet light in weight and easily handled. Made in three sizes, suitable for drilling in brick and concrete, light steel chipping and driving wood-working chisels—wherever hammering action is needed. Remarkably fast and useful in many ways on construction jobs. Blows are struck at rate of several thousand per minute.

Fitted with Universal Motors operating on A. C. or D. C.

See the Complete Van Dorn Line at Your Jobber's

For Power specify "Van Dorn"

The VAN DORN ELECTRIC TOOL CO.
TOWSON, MARYLAND, U.S.A.

The Van Dorn Electric Tool Co. CON
Towson, Maryland, U. S. A.

Send literature describing Van Dorn Electric Tools.

NAME.....

ADDRESS.....

JOBBER'S NAME.....

Among the first of the building supply dealers to see the profits to be made in transit-mixed concrete was McCrady-Rodgers Company of Pittsburgh, Pa. Starting with Autocars, they have continued with Autocars, and have recently added this heavy-duty model to their fleet. It is equipped with a 3½-yard Paris Transit Mixer body.

THE BEST PART OF THIS AUTOCAR DOESN'T SHOW IN THE PICTURE

TO look at this truck is to be filled with confidence in its ability to do heavy-duty contracting work dependably. Yet, to look at it and nothing more, is to be unaware of what a great motor truck it is.

The picture does not show the 101 h. p. Autocar Blue Streak 6-cylinder engine that does its work powerfully and dependably beneath the hood. The picture does not show the delicate precision machinery that sets the highest standards in the industry for every working part of this truck. Nor does the picture show the faithful Autocar Service Organization that protects the owner's investment in this modern piece of equipment for hauling transit-mixed concrete.

Nevertheless, these things are definitely "a part of the picture" of every Autocar truck. Contractors who are shrewd enough to get the entire picture when buying motor trucks are decidedly in favor of Autocars.

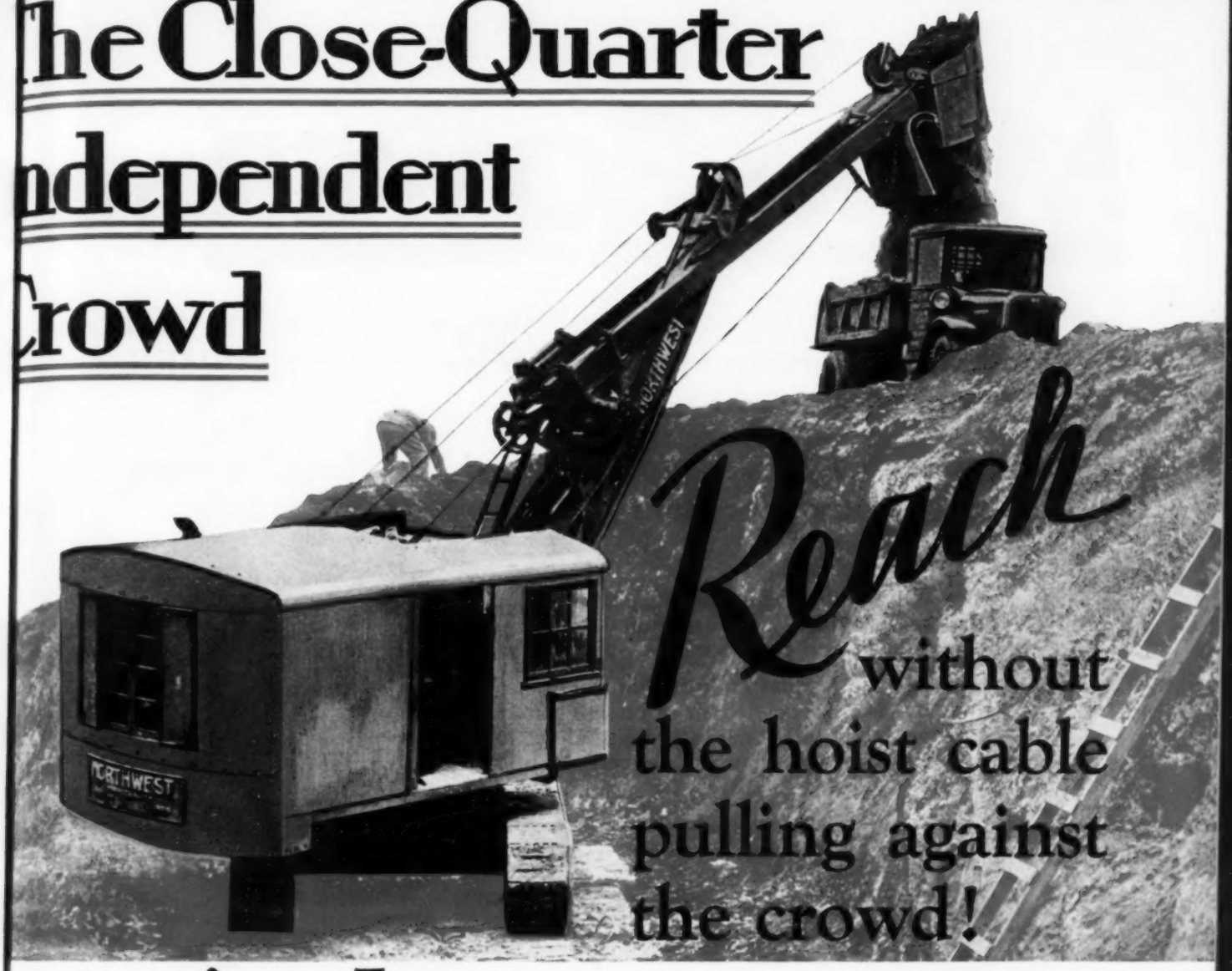
AUTOCAR TRUCKS

PRECISION BUILT

THE AUTOCAR COMPANY, *Ardmore, Pa.*

The booklet "Autocar Trucks for Hauling Building Materials" will tell you who and when and why. Will you tell us where to send your copy?

The Close-Quarter Independent Crowd



Reach without the hoist cable pulling against the crowd!

Z-Z-Z-ZING—out go the sticks in a single operation! There is no fighting between hoist and crowd—no juggling of levers and mechanisms to keep the dipper up—just a fast, smooth maneuver that spots the dipper accurately and assures a speedy return for another load.

And because the Northwest Close-Quarter Independent Crowd does not split the engine power between crowding and hoisting, it handles 25% harder digging.

These things mean pay dirt! Ask about them!

NORTHWEST ENGINEERING CO.

The world's largest exclusive builders of gasoline, oil burning and electric powered shovels, cranes and draglines

1731 Steger Building — 28 East Jackson Boulevard

Chicago, Ill., U. S. A.

NORTHWEST

MORE POWER TO T

Smooth 4-cylinder performance multiplies the many and well known paving advantages of the ORD FINISHER for concrete and asphalt paving.

4-cylinder power speeds up the finishing---handles more material---produces more finished yardage per day.

Blaw-Knox offers this higher powered finisher to concrete and asphalt road builders with assurance of the same smooth and satisfactory performance and results which have always characterized the ORD.

Because road builders admit that the basic double screed principle of the ORD is correct—it will of course remain unchanged. Mechanical improvements will constantly be made to keep the ORD in step with engineering progress and advanced methods in road building.

As to ORD performance—consult any user—or ask us to send you the book of evidence showing the opinions of ORD users throughout the country.

BLAW-KNOX COMPANY, 2086 Farmers Bank Bldg., Pittsburgh, Pa.

NEW YORK CHICAGO CLEVELAND DETROIT PHILADELPHIA BUFFALO BALTIMORE BIRMINGHAM

EXPORT DIVISION: Blaw-Knox International Corporation, Canadian Pacific Building, New York

London, England, New Oxford House, Hart St., Holborn, W. C. I.—Paris, France, 1 Rue de Clichy
Milan, Italy, 6 via S. Agnese, 6—Dusseldorf, Germany, 17 Bismarckstrasse

The ORD can be furnished:

- *with single screed*
- *with double screed*
- *with single screed and tamper*
- *with double screed and tamper*

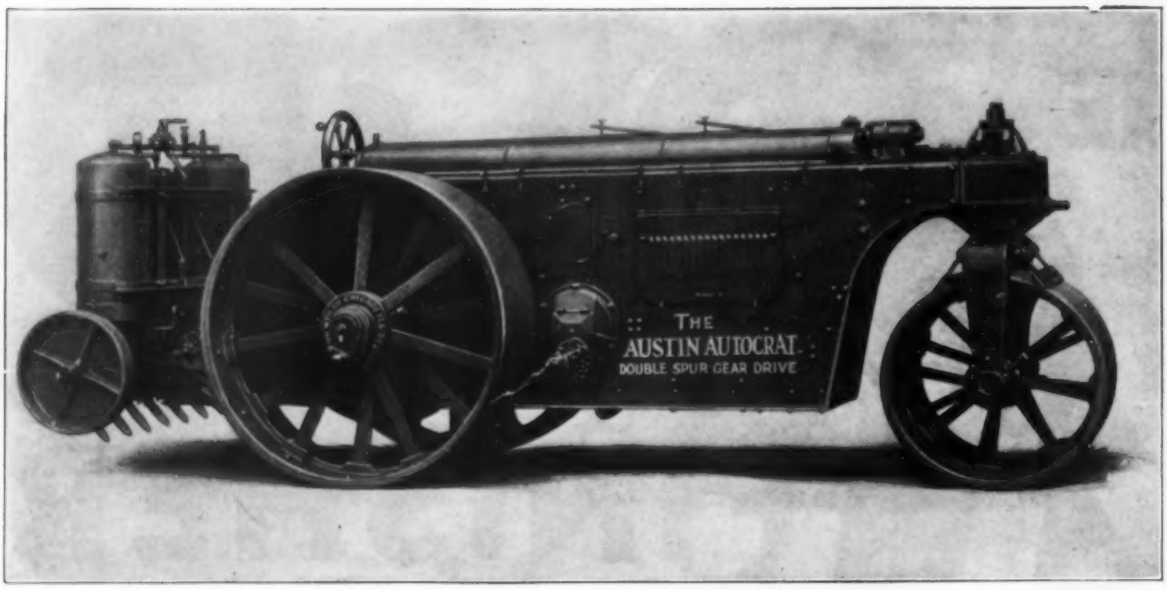
EASY ACCESSIBILTY of PARTS—another reason why road builders like the ORD FINISHER.

Make quick repairs and adjustments with minimum delay to the job.

BLAW-KNOX

BL

Road Forms — Ord Road Finishers — Weighing Batchers — Volume Batchers — The Cementank — Bulk Cement Plants — Wagon Graders — Steel Forms for Streets and Sidewalks



Double Spur Gear Drive Autocrat with powerful pneumatic scarifier

There's a practical reason why every AUTOCRAT feature means better rolling results!

The new Austin Double Spur Gear Drive Autocrat Roller has established the Autocrat name more firmly than ever at the head of the list of fine performing rollers.

No expense has been spared to make it the *finest roller in the world!*

The startling improvements and refinements found in the new Autocrat are but natural results of the *highest standard of material and workmanship* ever put into a roller. A higher *factor of safety* has also been obtained. The normal life of the new Autocrat is *years* beyond that of ordinary rollers.

Outstanding features

The new Austin Autocrat is now equipped with a double spur gear drive of *exceptional efficiency*. A differential gear is regular equipment on all models.

The heavy-duty motor develops abundant power for rolling, and the *toughest* scarifying jobs. An unusually short wheel-base increases maneuverability in close quarters. Amazingly easy to steer and handle! Low center of gravity *insures* smooth work and *prevents* side sway. Two speeds forward and reverse! Shifts from forward to reverse *without changing gears* or releasing master clutch.

Send for booklet

The Autocrat is made in 10 and 12-ton sizes. Write for descriptive literature for your files. The Austin-Western Road Machinery Co., 400 N. Michigan Ave., Chicago. Branches in principal cities.

Other Austin Rollers *include:*

The Austin Cadet, a completely factory-built roller, brings to the small, or pup roller field, convenient operating features heretofore available only on the finest of the large rollers. Special Transmission gives 3 traveling speeds forward and reverse. A 4-cylinder, heavy-duty motor provides ample power for rolling, leveling and scarifying. Comes in 5, 6 and 7-ton sizes.

An Austin Pup Roller with a Case Model "CI" Power Plant.

An Austin Bull Pup Roller with Center Planing Blade and Rear Scarifier.

An Austin 4-Cylinder Tandem Roller.

Austin-Western
ROAD MACHINERY

ARRIVED!

the 32-B

GAS, DIESEL or ELECTRIC CONVERTIBLE SHOVEL

a new 1-yard BUCYRUS-ERIE

Only Bucyrus-Erie can offer you all these advantages

Fast Operating Speeds — Remarkable Stability

Ample Power—(6 cylinder gas engine)

Effortless, Sure Control—Oversize clutches and brakes. Hoist clutches power set. All operating levers toggle in. Double-operating chocking brakes, applied from operator's stand. Swing brake for operating on grade. Direction of motion of operating levers can be easily changed to suit operator.

Easy Propelling—Steered from operator's stand with cab in any position. Propelling brake also controlled from stand. A friction brake locks the swing during propelling.

Profit Protection—Bucyrus-Erie ruggedness a factor of safety against break-downs and excessive repair costs. This machine is packed with mechanical improvements that cut costs.

Either rope or chain crowd.

Special extra long and wide tread mountings for soft ground dragline work.

The newest of the new Bucyrus-Erie line of universal machines, the 32-B is destined to make new history— and new profits — wherever dirt is moved.

Built into this machine is the experience of over fifty years, experience gained in building more excavating machines than any other manufacturer in the world.

The 32-B is rugged, nicely balanced, powerful, fast — combining more features which increase output and lower the costs of digging, than any other 1-yard machine.

Send for full specifications.

Faster, lower cost digging is at hand.

A-316

BUCYRUS-ERIE COMPANY, South Milwaukee, Wisconsin

Representatives throughout the U. S. A. *Branch Offices:* Boston, New York, Philadelphia, Atlanta, Birmingham, Pittsburgh, Buffalo, Detroit, Chicago, St. Louis, Kansas City, Mo., Dallas, San Francisco. Offices and distributors throughout the world.

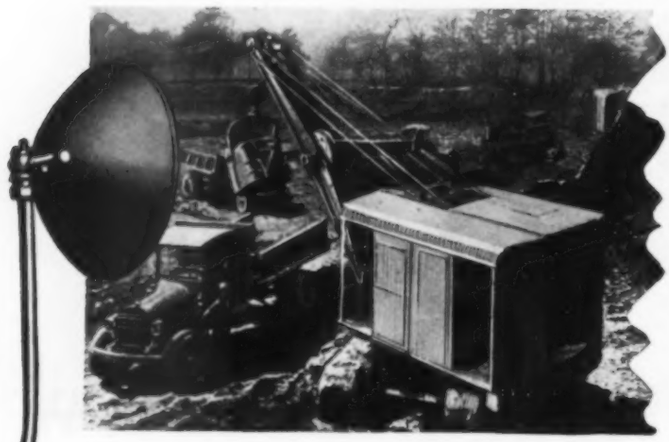
BUCYRUS ERIE

1/2-yard
5/8
3/4
7/8
1
1-1/4
1-1/2
1-3/4
2
2-1/4
2-1/2
3
3-1/2
4
4-1/2
5 and up to 16 yards

Shovels
Draglines
Clamshells
Lifting Cranes
Dragshovels
Magnet Cranes
Tunnel Shovels
Dredges
Dragline Buckets

Gasoline
Diesel
Gas + Air
Electric
Steam
Diesel-Electric

Maintain Your Schedule from the Beginning *with* CARBIC LIGHT



It's easy to make up for delays if they are not allowed to accumulate. Carbic Flood Lights enable men to work rapidly and safely after sundown. That's why they are a part of many progressive contractors' equipment.

Carbic Flood Lights furnish penetrating, clear, white light of great power. It is perfectly diffused—there is no glare and no dark shadows—yet penetrates fog, smoke or dust. It is good light to work by.

The Carbic Flood Light is of extremely rugged and durable construction. It is simple in design and simple to operate. It consists of only three parts and cannot be incorrectly assembled. Charging is a one-man job requiring only a few minutes. Reflectors are chromium-plated, rust- and tarnish-proof.

Carbic Flood Lights are low in first cost, economical to operate, and pay for themselves quickly. They are compact, portable, dependable and safe. They help to regain lost time and keep jobs on schedule.

Sold by leading jobbers everywhere

Let us send you this booklet describing in detail Carbic Flood Lights and their uses. A request on your letterhead will bring it.

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

126 Producing Plants UCC 627 Warehouse Stocks

IN CANADA, DOMINION OXYGEN COMPANY, LTD., TORONTO

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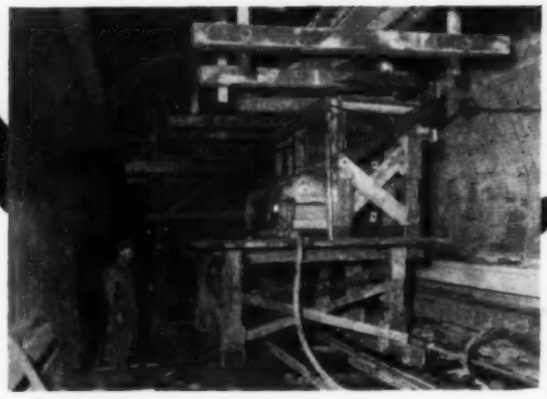
CARBIC

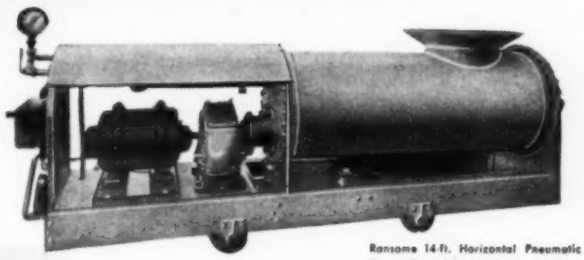
PROCESSED CARBIDE FOR CARBIC LIGHTS & GENERATORS

LINDE OXYGEN · PREST-O-LITE ACETYLENE · OXWELD APPARATUS AND SUPPLIES · UNION CARBIDE

the STORY of Ransome PNEUMATIC PLACERS



Placing roof of Vehicular Tunnel—New York City to Jersey City.



Ransome 14-ft. Horizontal Pneumatic Placer. Capacity 14 cubic feet per shot.

Ransome Pneumatic Grout Mixer and Placer.

Every contractor and every engineer who has a problem of placing concrete in subways, railroad tunnels, water tunnels, sewers or mines should have a copy of our new illustrated 24-page Bulletin No. 105 B.

It tells the advantages of using the Ransome Pneumatic Concrete Placer and the Ransome Pneumatic Grout Mixer and Placer—lists important jobs—contains air requirements, outputs and other operating data. It is a hand book on placing concrete and grout by compressed air.

Send for a free copy—and mail the coupon.

FILL OUT AND MAIL THIS COUPON FOR DETAILED INFORMATION ON SPECIFIC JOBS

1. Length of tunnel, end to end .....
2. Length between shafts .....
3. Height and width in rough .....
4. Height and width, finished section .....
5. Minimum thickness of concrete and point at which it is found .....
6. Amount and location of reinforcing .....
7. Is tunnel in rock or earth? .....
8. Will tunnel excavation be completed before lining? .....
9. If mucking, while lining, must muck cars pass through forms? .....
10. If in soft ground, will concreting follow up behind heading? .....

    Estimated distances .....
11. Length of form used, steel or wood, and print of same .....
12. Type of concrete cars. Height and width .....
13. Locomotive (if used). Height and width .....
14. Size and kind of gravel or stone used .....
15. Compressed air available in cubic feet per minute .....
16. Will drills, air hammers, etc., operate from this supply when blowing concrete? .....
17. Gauge and size of track used .....
18. Electric current available for operating motor on placer .....
19. How much yardage to be placed by air is involved? .....
20. What length of time allowed for placing this yardage? .....
21. Make sketch showing measurements mentioned in 3, 4, 5 and 6 .....
22. For whom is job being done? .....

Location of job .....

Name .....

Company .....

Position .....

Address .....

City ..... State .....

Ransome Concrete Machinery Company

1850—Service for 81 Years—1931

Dunellen **New Jersey**

At Left: One of the shovels operated by the Lewis Construction Co. on their contract for building a railroad from Boulder City to site of the Hoover Dam

At Right: Work of R. G. LeTourneau, Inc., who are building a highway over the mountains to the dam site. Note the tough digging.

Preliminary Work on the Hoover Dam is Being Rushed...

—and "HERCULES" (Red-Strand) Wire Rope is on the job, being used by both of the contractors whose work is illustrated above.

"HERCULES" (Red-Strand) Wire Rope is in great demand on rush work because of its exceptional strength and endurance. Its longer life makes changes less frequent.

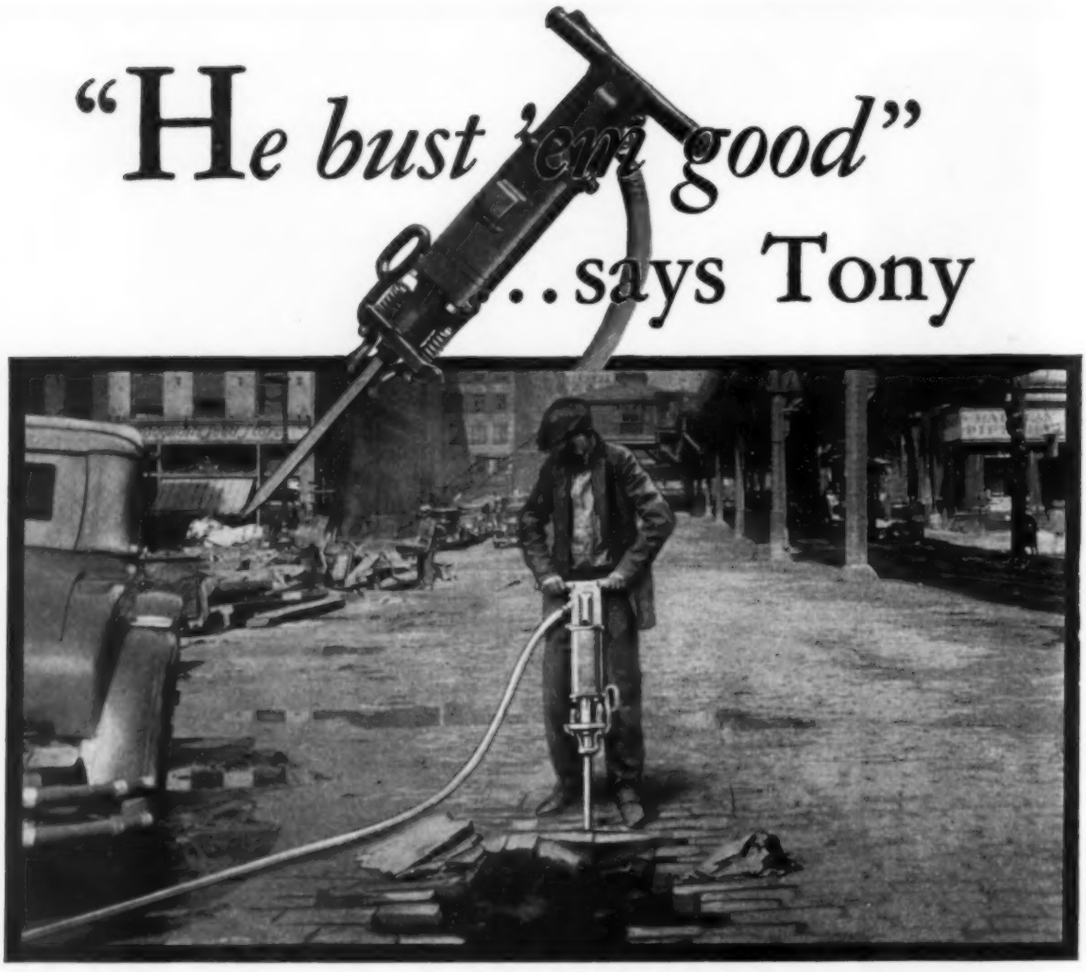
And why does it have longer life? Because (1) it is made of acid open hearth steel wire; (2) every wire used is first rigidly tested by us to make sure it meets our exacting requirements; (3) our manufacturing methods and equipment insure even tension on both the wires and the strands; (4) it is made in both Round Strand and Patent Flattened Strand constructions in order to meet all working conditions.

Made Only by **A. Leschen & Sons Rope Co.** Established 1857

5909 Kennerly Avenue
ST. LOUIS

New York Chicago Denver San Francisco

"He bust 'em good" ...says Tony



Two of these Worthington-Gilman Pavement Breakers can be operated efficiently from a single 110 ft. portable air compressor.

A REAL measure of the efficiency of a pavement breaker is the attitude of the man who operates it. And Tony's laconic commendation of his Worthington-Gilman Breaker is typical.

Considering its size and weight (65 lb.), this No. 12 Pavement Breaker is the most powerful machine on the market. Its simplicity of construction, freedom from heavy vibration, rapidity and force of hammer blow, and its economy in the use of air have made it the choice of many contractors who analyze costs and demand maximum results.

For breaking pavement, cutting asphalt, removing Belgian blocks, ripping up frozen ground, and heavy tamping... this Breaker will pay its own way.

The nearest Worthington office will supply further information. *Request Bulletin W-1208-S1.*

PUMPS *All Sizes... All Types* *For All Services* *Any Capacity... Any Pressure*	COMPRESSORS *Stationary and Portable*
CONDENSERS and Auxiliaries	ROCK DRILLS
DIESEL ENGINES	AUTOMATIC HEAT TREATING MACHINES FOR DRILL STEEL
GAS ENGINES	FORGING FURNACES FOR DRILL STEEL
FEEDWATER HEATERS	DRILL STEEL
WATER, OIL and GASOLINE METERS	ACCESSORIES
MULTI-V-DRIVES	CHROMIUM PLATING

Literature on request

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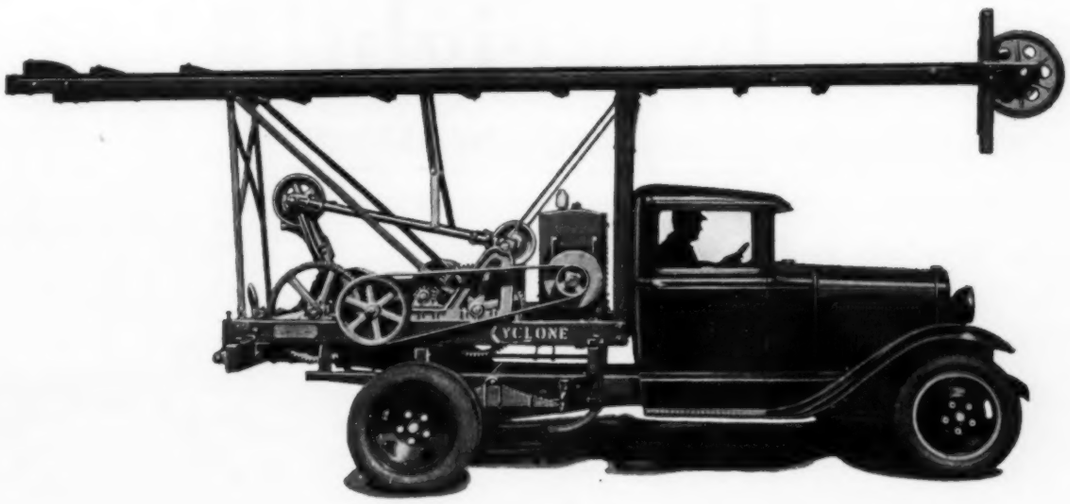
T-9 **WORTHINGTON**

Cut Rock Moving Costs!



The new No. 25 Cyclone Drill Mounted on 1½ ton Ford Truck. A new equipment for Light Blast Hole Drilling—Foundation Testing—Drilling for Piling. Is the most compact—light weight—economical drill on the market today. Furnished for either Truck Mounting or as portable unit. The cost of the No. 25 without tools is less than $1000.00. Write for full descriptive literature on this new equipment.

For heavier Blast Hole Work, Cyclone No. 14 Drills have been adopted by large Construction Companies throughout the world. The No. 14 line is furnished in three sizes:—The No. 14 Jr.—No. 14 Standard—No. 14 Super in the New Front Wheel Caterpillar Drive, with either gasoline or electric power. Our 120 page book not only contains descriptive matter on our No. 14 line of drills but there are more than fifty pages devoted to Drill work Methods and Costs and other data of interest to the Contractor who is confronted with rock moving problems. Send for your copy of this book.

THE SANDERSON-CYCLONE DRILL CO.
ORRVILLE OHIO, U. S. A.

The Sanderson-Cyclone Drill Co.
Orrville, Ohio, U. S. A.
☐ Send Booklet on No. 25 Drill
☐ Send 120-page book on Drilling Methods
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Mix aggregates by weight!

New Fairbanks Scales save time and permit accurate control of mix . . .

Fairbanks Skip Mixer Scale showing the three ingredient beams.

Meet rigid specifications without increasing labor cost of mixing concrete. Control mixes with the same accuracy on large jobs and small. Two new Fairbanks Scales —the Skip Mixer Scale and the Wheelbarrow Scale—offer important advantages that reduce mixing time and insure the same quality standard on *all* jobs. Built to stand hard use. Easy to move from job to job. Typical "Fairbanks" quality throughout. Moderately priced. Ask your equipment dealer about these new Fairbanks Scales or write us for complete information.

FAIRBANKS, MORSE & CO.
900 S. Wabash Ave., Chicago
And 40 principal cities—a service station at each house

The Fairbanks Wheelbarrow Scale. Sturdy. Accurate. Light in weight. Easy to move from job to job.

Fairbanks Skip Mixer Scale mounted on special dolly for towing.

Read These Facts
about the new Fairbanks Scales

1. They enable contractors to meet rigid specifications without increasing labor costs.
2. Cut mixing time on every job.
3. Do the work of two ordinary scales because of three beam construction.
4. Are easily transported.
5. Built to withstand hard use. All steel welded frames and beam boxes.
6. Tell-tale device indicates when beam is approaching balance.
7. Comply fully with American Road Builders Ass'n specifications.
8. Skip Mixer Scale has automatic safety gear that relieves weighing mechanism of shock when skip is dropped.
9. Platform of Wheelbarrow Scale only 9 inches from ground.

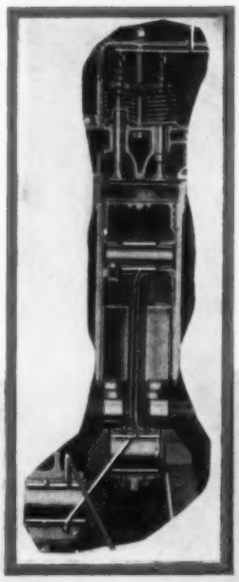
Fairbanks Scales

Preferred the World Over

5517-B.A.31.4

Written off the books
but still earning

Long service life is designed into Allis-Chalmers tractors. One factor is lubrication. Purolator-cleaned oil is forced at constant pressure to all bearings including Piston Pin and Rocker Arm Bearings. To big power and ruggedness is added *endurance* — the final test of tractor value.



A free trial *on your job* *Ask your Dealer*

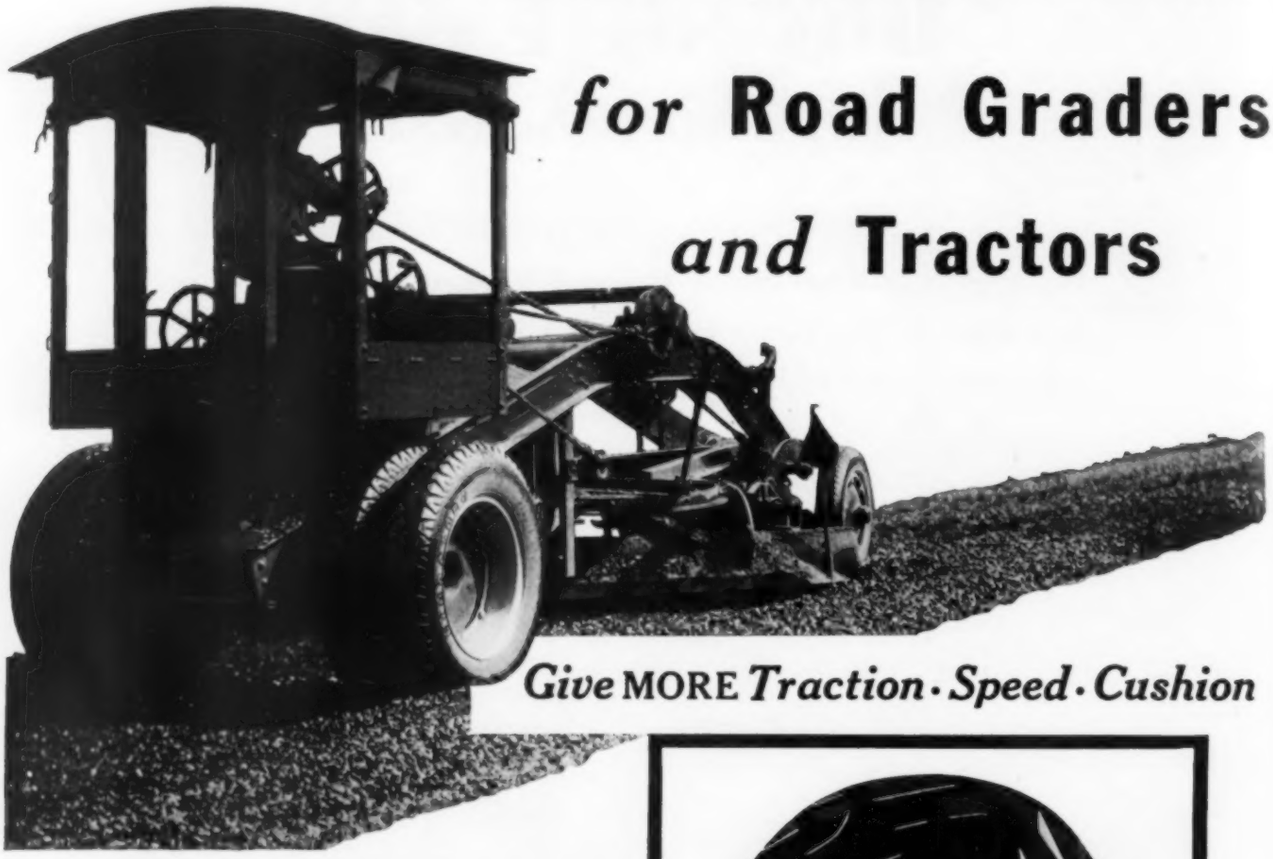
Monarch "75", "50" and "35" track-type tractors. Model "U" wheel and track-type tractors and power units.

ALLIS • CHALMERS • TRACTORS

SPRINGFIELD, ILLINOIS . . . MILWAUKEE, WISCONSIN

FIRESTONE PNEUMATICS

for Road Graders *and* Tractors



Give MORE *Traction · Speed · Cushion*

In mud, sand, gravel—wherever maximum traction is important—you'll find that Firestone Pneumatics pull better. Their massive non-skid projections give greater contact surface—more gripping power in any kind of going.

In addition, road-graders and tractors equipped with Firestone Pneumatics travel faster—save valuable working time. Save money too, on replacements, because Firestone Pneumatics cushion your equipment against destructive shocks and vibrations.

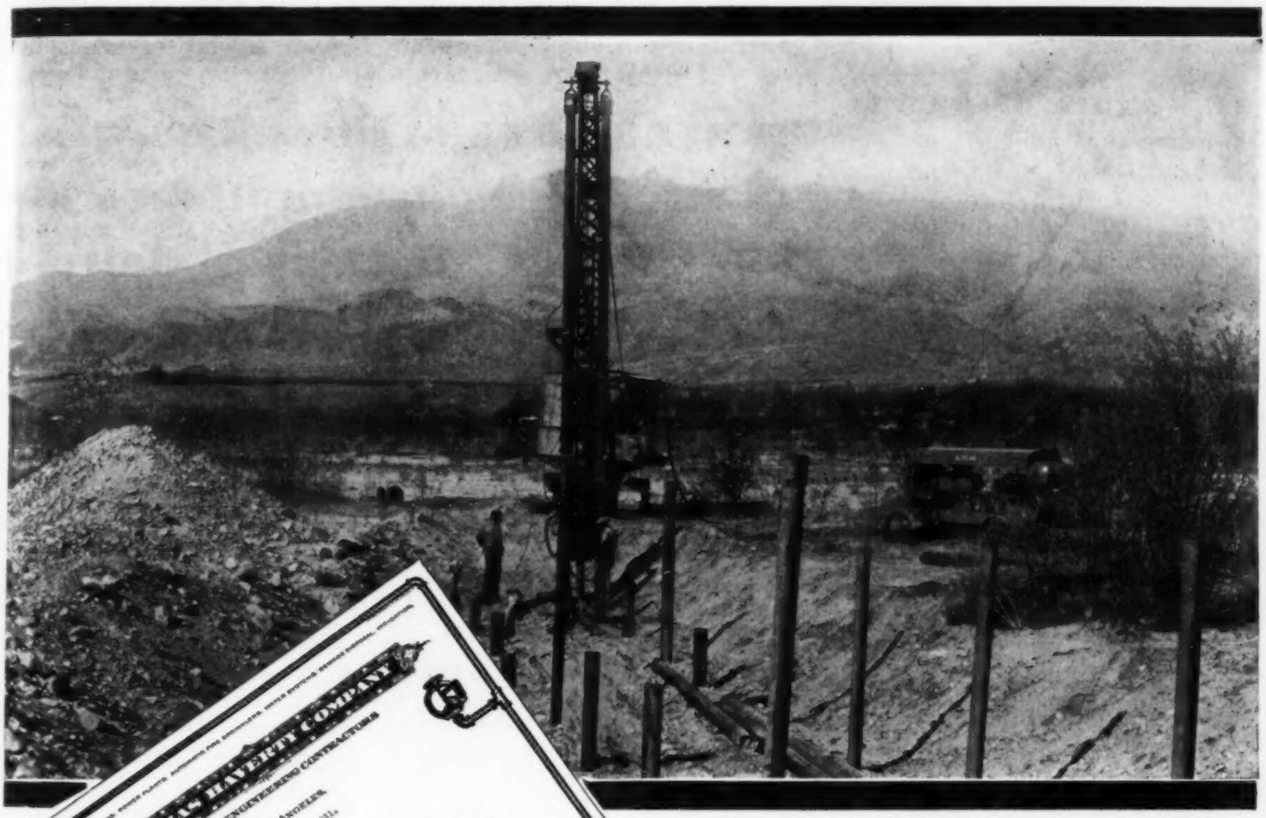
When purchasing new equipment, specify Firestone Pneumatics, Firestone Puncture Proof Tubes and Firestone Rims.

Firestone

GROUND GRIP PNEUMATICS

TIRES · TUBES · BATTERIES · RIMS · BRAKE LINING · ACCESSORIES

A BIG JOB—A BIG CONTRACTOR—A BIG SCHRAMM



Plenty of air power for pile driving is supplied by one of the three SCHRAMM Compressors owned by the Thomas Haverty Company of Los Angeles, California and used on the big flood control task of the Santa Clara River.

THOMAS HAVERTY COMPANY
SANITARY ENGINEERING CONTRACTORS

Los Angeles,
January 30, 1931.

Schramm, Inc.,
Westchester, Pa.

Gentlemen:

During the construction of the Santa Clara River Flood Control work, we made odd occasion to use three of your Schramm Compressors, two of them being of 500 C. F. M. capacity and one of 210 C. F. M. These three units of equipment have proven amongst the most satisfactory pieces of equipment we have ever employed on the many types of work and machines on which they have been given us the best service throughout.

All three of the compressors were operated from ten to twelve hours daily continuously for a period of about three months and were operated with a minimum of repairs and attention.

We are particularly impressed with the virtues of the disconnecting clutch, which we believe is more or less of an innovation to compressors.

Should we be in the market for compressors in the future, you may rest assured that first consideration will be given to the Schramm.

Yours truly,
THOMAS HAVERTY COMPANY
By R. Burlingame

THOMAS HAVERTY COMPANY

of Los Angeles

have found from experience that the BEST equipment MUST be used on their jobs to obtain maximum results from the working end and consequently the profit end of every contract. And like numerous other large contractors throughout the world, they have selected SCHRAMM Compressors after a comparison with other machines ON THE JOB. Read their letter—an expression of absolute satisfaction.

Use the clipping—to learn more about "SCHRAMMS"—and a dependable way to bigger profits.

SCHRAMM INC., West Chester, Pa.
Please send bulletin on Portable Compressors ☐
Stationary Compressors ☐ Welders ☐
Name .....
Address .....
City .....

Schramm Inc.

WEST CHESTER, PENNSYLVANIA

Representatives in every important city.

AUTOMATIC DIPPER TRIP. Engine trips the dipper. Not necessary for operator to take hands off controls. Good for 10 truck loads more a day.

EASY ON THE OPERATOR. Saves operator's muscle by making the engine engage the clutches.

Engine clutch control at operator's position. Saves steps and gas.

Automobile type pedals as comfortable as an old pair of shoes.

CENTER DRIVE SHOVEL BOOM. Loads your trucks on a higher bank. Digs and dumps higher up, digs deeper below the treads, reaches farther out than any other shovel of equal length boom and dipper stick.

Patented greenhorn on end of stick enables using every inch of its length.

PARTS SERVICE. At Lorain, 96% of telegraphic orders and 92% of all orders shipped within 24 hours. Local parts depot service throughout the United States.

All parts are machined and assembled to jigs, fixtures and templates to insure uniformity and easy interchangeability.

SIMPLIFIED CONTROLS. In the shovel: 3 levers, only 1 foot pedal. In the crane: 2 levers, 2 pedals. With only these controls to handle, operators can show real speed.

PRECISION 2 SPEED HOIS LINE CONTROL. High spe in hoisting crane loads. Low spe moves the load a fraction of an in per second for precision placin

EVERY ONE of these Thew Lorain features accomplishes one o four things: increases daily pro ductive capacity . . . or . . . protect you against delays due to repairs on the job...or...reduces operating cost and maintenance expense

LORAIN 6 POINT CAB. All steel. New comfort and coolness, new visibility, new convenience and safety. And it's the smartest looking of them all.

SIMULTANEOUS OPERATION FOR CRANES. Hoists, swings, and travels (or derricks the boom) all at the same time.

CENTER DRIVE FLEXIBILITY. One Powerful Mot with the flexibility of three. Pow applied directly to 3 operations one time, each independently co trolled, or concentrated to a one operation.

CENTER DRIVE SIM PLICITY. Fewer shafts a gears, fewer moving parts to we

THEW

SPEED CENTER DRIVE CRAWLER. Famous for low maintenance cost because of simplicity of moving parts.

speeds in either direction with ual efficiency. Double the power tio in low gear for tough going.

ropelling mechanism runs in a nstant oil bath.

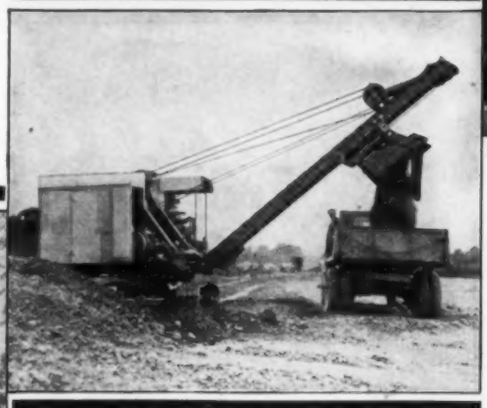
hrough axles to carry the weight, y one of which can do it alone.

o dead weight on any propelling shaft.

CENTER DRIVE CROWD. The power that propels a Lorain machine with all its tons of steel at ½ miles per hour, can be concentrated directly to the crowd motion when the machine is digging.

THOROUGH INSPECTION. 89 tests and inspections of *each* machine.

A SHOCK ABSORBING FAIRLEAD. Automatic straight lead from guide sheave to bucket. Saves cables.



POSITIVE CHAIN CROWD. Made of special heat treated alloy steel. Self adjusting to all boom angles.

AUTOMATIC CROWD BRAKE. Automatically holds the stick extended without attention from the operator.

EXTENDED TRUCKS. One standard truck, variable in length to suit ground conditions.

INTERCHANGEABLE LAGGING. Flexibility that gives extra speed for easy digging—extra power for tough digging.

CONVERTIBLE UNITS. Shovel, crane, dragline, clamshell, skimmer-scoop, backdigger units are interchangeable. Lorain 75 turntables are transferable to 8-wheel locomotive car bodies.

GAS, DIESEL, ELECTRIC POWER. Without changes in the basic Center Drive design.

SWING BRAKE. Quicker, more accurate swing control.

TIP AND TILT BACKDIGGER DIPPER. Accurate control in digging and spotting the load. More than a trench-digger—an all round excavator.

ALL STEEL CRANE BOOMS. 2 Sections, with intermediate middle sections—gooseneck top sections.

The automatic dipper trip alone, operators say, is good for 10 more truck loads a day.

THE THEW SHOVEL CO. • Lorain, Ohio

LORAIN-45-55-75

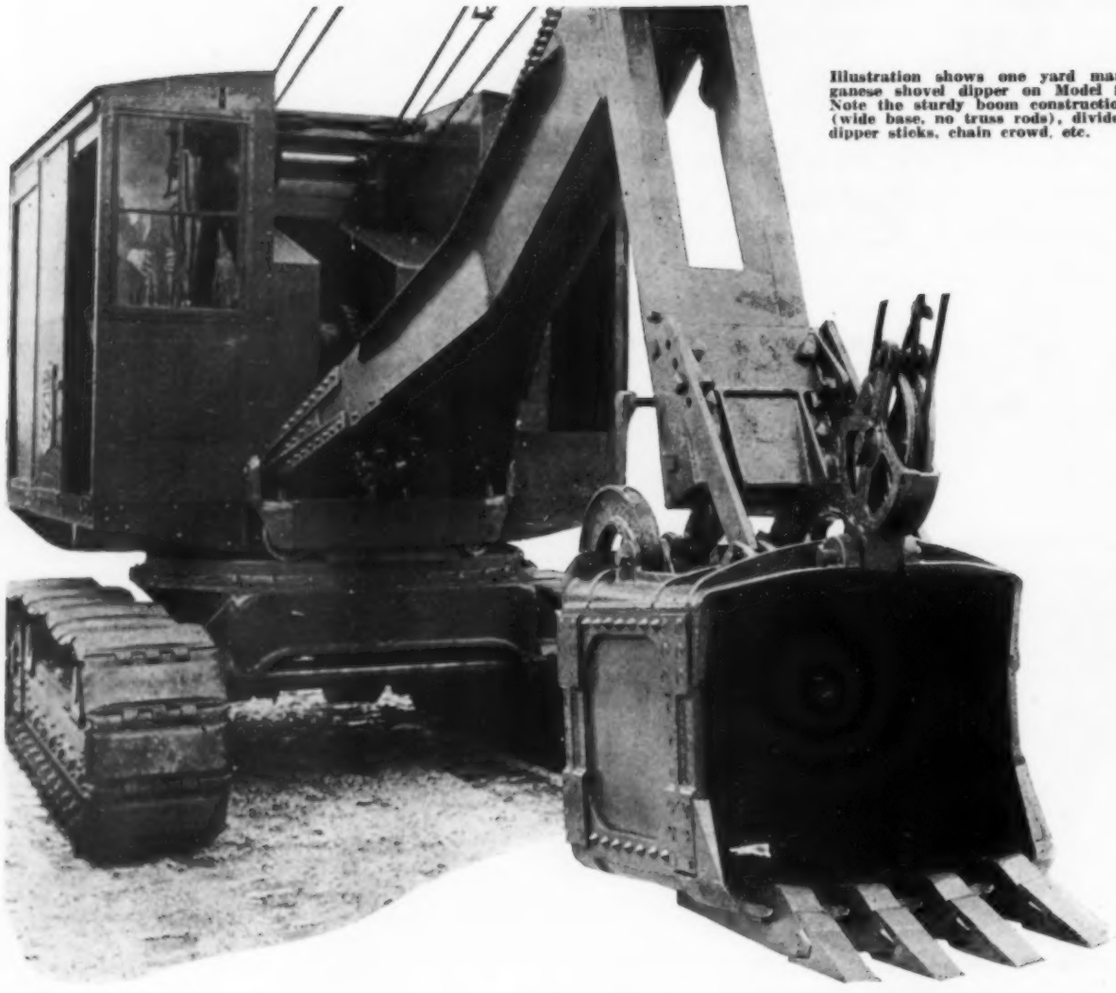


Illustration shows one yard manganese shovel dipper on Model 8. Note the sturdy boom construction (wide base, no truss rods), divided dipper sticks, chain crowd, etc.

MODEL R is a ¾-yd. shovel—12-ton crane. Model S is a 1-yd. shovel—17½-ton crane. Both of identical design. Both full revolving and convertible.

Ease of propelling is an outstanding feature. Heavy differential propelling mechanism (patented) permits steering in either direction without stopping the forward motion of machine.

Distance from Boom Base to center of Rotation is only 30 in.—Boom Base located directly over roller path. These points give unusual stability. Exceptionally large diameter, 76-in. roller path and 8-in. dia. center post eliminate tipping or rocking of revolving upper structure.

Independent "Single Chain" crowd permits vigorous shaking of bucket. Gives faster positively-controlled reverse crowd action and high lift and long reach. Patented automatic chain adjustment for any boom angle. Crowd chain lasts for years—no lost time and broken crowd cable expense.

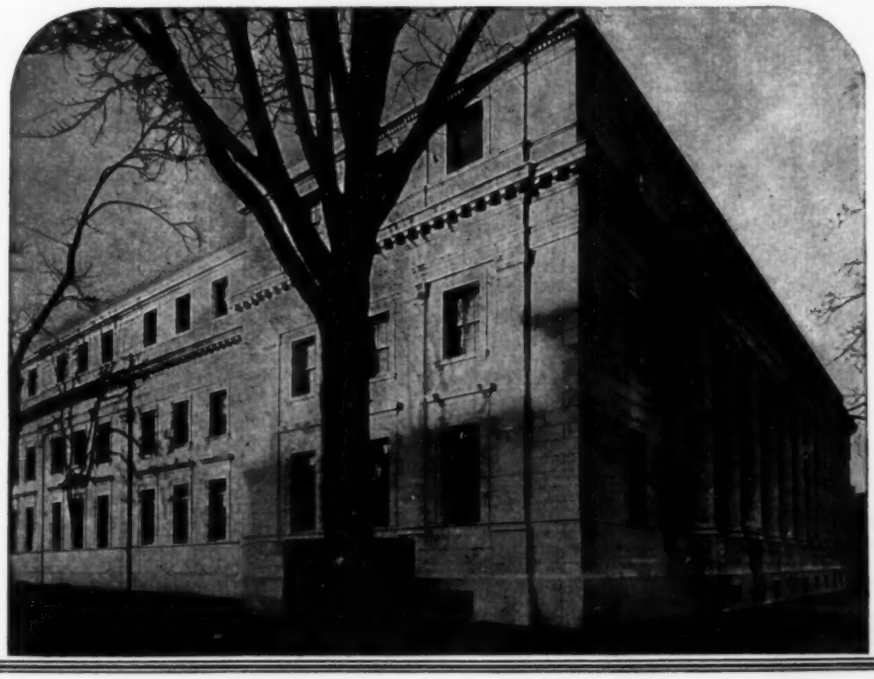
Positive (patented) swing lock is exclusive with BAY CITY. No brake bands to slip and cause accidents. Ball bearings on all main shafts . . . . For complete story, get Catalog RS-4.

BAY CITY SHOVELS, Inc.

Eastern Office: Roselle Park, N. J. BAY CITY, MICH.

BAY-CITY SHOVELS

THE BAY-CITY FAMILY OF FAST WORKERS



Delaware County Court House, Media, Pa. Foundation walls dampproofed by spraying outside surfaces with Headley Emulsified Asphalt. Architect, Clarence Beazer. General Contractor, Arey Houser. Applicator, Architectural Waterproofing Company.

FOR WATERPROOFING and DAMPPROOFING of FOUNDATIONS

you save time, labor and money by using HEADLEY EMULSIFIED ASPHALTS at all exposed locations

THE time lost for melting solid asphalt, and in winter waiting for favorable weather is saved with Headley Emulsified Asphalts as they apply cold and bond perfectly to *cold* or *damp* surface and are not injured by freezing.

The labor of firing and hauling a melting kettle and its fuel, and of chopping solid asphalt out of barrels is avoided as Headley Emulsified Asphalts pour freely at any working temperature (above 35 deg. F.) and come from the container ready for use.

The money spent for keeping preheated solid asphalt warm enough to apply, for the wasted chips that stick to barrel staves or fall in the street and for the asphalt that sticks to or burns at the melting kettle is all saved. As Headley Emulsified Asphalts brush or spray more quickly than melted solid asphalts can be mopped and no skill is required, further substantial saving in both amount and grade of labor is assured.

And best of all, the permanent imperviousness of the uniform ductile and tightly bonded residue of pure asphalt affords the maximum of protection against ground water, moist soil, damp or salt air, industrial fumes, and all weather elements.

One trial of Headley Emulsified Asphalts and you will be through with preheated solid asphalts and "cut-back" asphaltic products with their application difficulties, fire hazard and dangers to workman. Send for a sample and see for yourself.

Prompt shipment from stocks carried in:

Akron	Atlanta	Boston	New Haven
Albany	Baltimore	Buffalo	New Orleans
Altoona	Birmingham	Charleston	Omaha
		Charlotte	Peoria
		Cleveland	Philadelphia
		Columbus	Pittsburgh
		Des Moines	Providence
		Detroit	Richmond
		Erie	Savannah
		Fort Wayne	South Bend
		Grand Rapids	Springfield, Mass.
		Hartford	
		Indianapolis	St. Louis
		Kansas City	St. Paul
		Memphis	Syracuse
		Miami	Tampa
		Milwaukee	Toledo
		Minneapolis	Trenton
		Mobile	Washington
		Moline	Wilmington
		Montgomery	Worcester, Mass.
		Newark	
		Norfolk	Youngstown

and fifty other industrial centers.

Write for literature or consult catalog pages in Sweets, A.S.M.E. Mechanical, and Chemical Engineering Catalogs. Ask for standard specifications, or Engineering advice.

Mail this coupon for FREE SAMPLE

HEADLEY EMULSIFIED PRODUCTS COMPANY
Emulsified Asphalts for Industrial Uses
Largest Manufacturers since 1908
Franklin Trust Building, Philadelphia
New York, Chrysler Bldg. Chicago, One LaSalle St. Bldg.
Works, Marcus Hook, Pa.

Please send Bulletin 330 and free sample of Headley Emulsified Asphalt.

Name and official position .....

Name of Company .....

Address .....

.....

Cons. Met.

These tools will help where today's job offers so little margin

H7 SINKER
C7 PAVING BREAKER

..use them, for their savings were never more important than they are today.....

There's no room for waste in today's job. The gap between profit and loss was never more narrow.

That's why, when this year every dollar saved is big money, Cleveland tools are so much in demand.

They are fast and efficient—they use less air—they do more for your dollar anyway you want to figure it. These facts, the Cleveland H7 Sinker and C7 Paving Breaker can prove to your profit, on your job.

Today is not too soon to take the savings that these tools will bring you. Now, more than ever before, you will want their efficiency, dependability and economy.

Let us put one in your hands for your trial.

The Cleveland Rock Drill Co.
3734 E. 78th St., Cleveland, Ohio
Branches, Agents and Service Stations in Principal Cities

CLEVELAND ROCK DRILLS

HERE'S MONEY VALUE *in "clean-up" ability*

no extra help needed when an OWEN *gets busy on the job . . . . .*

"Making a short day of three barges each containing 550 tons of material."

"Don't use any man to clean up while unloading. Don't need him."

"Cleans up an hour and a half quicker than any other bucket ever used. And clean-up with an Owen means *clean*."

These are an operator's own words, describing Owen Bucket performance, the kind of performance, that means minimum time and labor costs—profitable operation. It's the "Mouthful at Every Bite"—with nothing left for clean-up that proves an Owen's worth. And "Mouthful" with an Owen "S" means a whopper—no less!

For a steady, money-earning worker an Owen can't be beat. That's why the Owen guarantee pledges the same today as years ago—"A bigger day's work than any other bucket of the same weight and capacity."

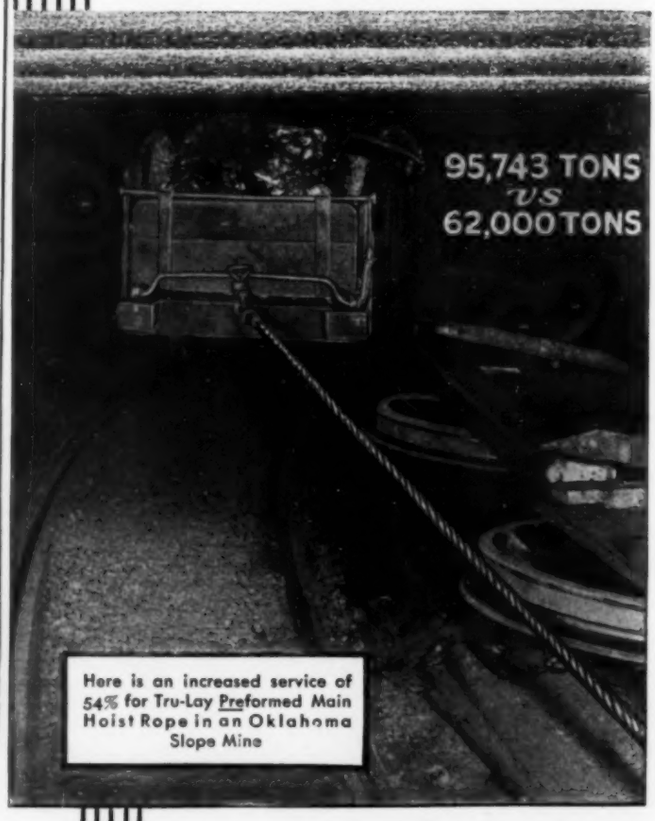
Illustrated literature showing 17 Owen construction features will interest you. Write for it—also, for a complete Owen Catalog.

The Owen Bucket Company
6023 Breakwater Avenue, Cleveland, Ohio

OWEN CLAMSHELL BUCKETS

Owen Buckets

A MOUTHFUL AT EVERY BITE



TONNAGE RECORDS PROVE TRU-LAY ECONOMY

Facts speak for themselves. Hundreds of our customers report increased services similar to those shown above.

From your cost records figure your wire rope expense on a service-per-dollar basis. Then install Tru-Lay Preformed Wire Rope. You will find that your wire rope dollar will buy 30% to 300% more service, depending on the character of your equipment and the nature of the service.

Let us send you more facts. Write for our interesting folder entitled "Why Preformed Wire Rope." A copy is yours for the asking, without obligation to you of any sort. Address:

AMERICAN CABLE COMPANY, *Inc.*

New York Central Building, 230 Park Avenue, New York, N. Y.
District Offices: Chicago, Detroit, Philadelphia, Pittsburgh, Tulsa, San Francisco
An Associate Company of the American Chain Co., *Inc.*

PREFORMED WIRE ROPE
TRADE **TRU-LAY** MARK
(REG. U.S. PAT. OFF.)

RELAXED CONSTRUCTION IS THE ANSWER . . . . . .

Wires and strands in Tru-Lay Preformed Wire Rope are helically shaped to lie in position naturally, without internal stress. Just as naturally and relaxed as your two forefingers are when you hold them together as shown above. This relaxed construction is the answer to long life in wire rope.

In ordinary wire rope, strands and wires are under a constant internal stress. This is well illustrated by crossing your fingers as shown at the right. Note pressure and friction when you move these fingers. Note also the strain in the muscles of your hand.

ACCO
TRADE MARK

PREFORMED WIRE ROPE
AMERICAN CABLE COMPANY
Preformed Strands Free Lasts Longer
NEW YORK
TRU-LAY

—See How Concrete Rides to New Low Costs on Recent Jobs

A complete story of how and why Belt Conveyors are actually cutting costs and speeding handling of wet concrete on big and little jobs all over the U. S. A.—send the coupon today.

Barber-Greene pioneered the standardized belt conveyor for handling wet concrete.

From the very first these installations showed tremendous economies in handling costs, tremendous gains in handling speed, new reductions in labor charges, practical elimination of segregation and other advantages.

Since then many new facts regarding the handling of wet concrete on moving belts have been brought to light.

And belt conveyors have been used on a wide variety of jobs such as: foundations for small buildings, sewer jobs, irrigation ditches, big and small reinforced concrete buildings, building floors, footings, caissons, viaducts, dams and the like.

The projects range from small buildings to some of the world's most famous buildings and construction jobs.

Many of these are detailed in this New Barber-Greene Book "Concrete Handling." It shows many jobs, some of which must be like your own, on which belt conveyors are saving money and speeding work. And it shows how belt conveyors turn the trick.

There is no obligation. Just send the coupon.

This coupon brings your copy of the New Book "Concrete Handling"—no obligation. Send for it today.

BARBER GREENE

SPECIALIZING IN INVENTING FASTER AND CHEAPER MACHINES AND METHODS

BARBER-GREENE CO., 530 W. Park Ave., Aurora, Ill.

BARBER-GREENE COMPANY
530 West Park Avenue, Aurora, Ill.

Your Name .....

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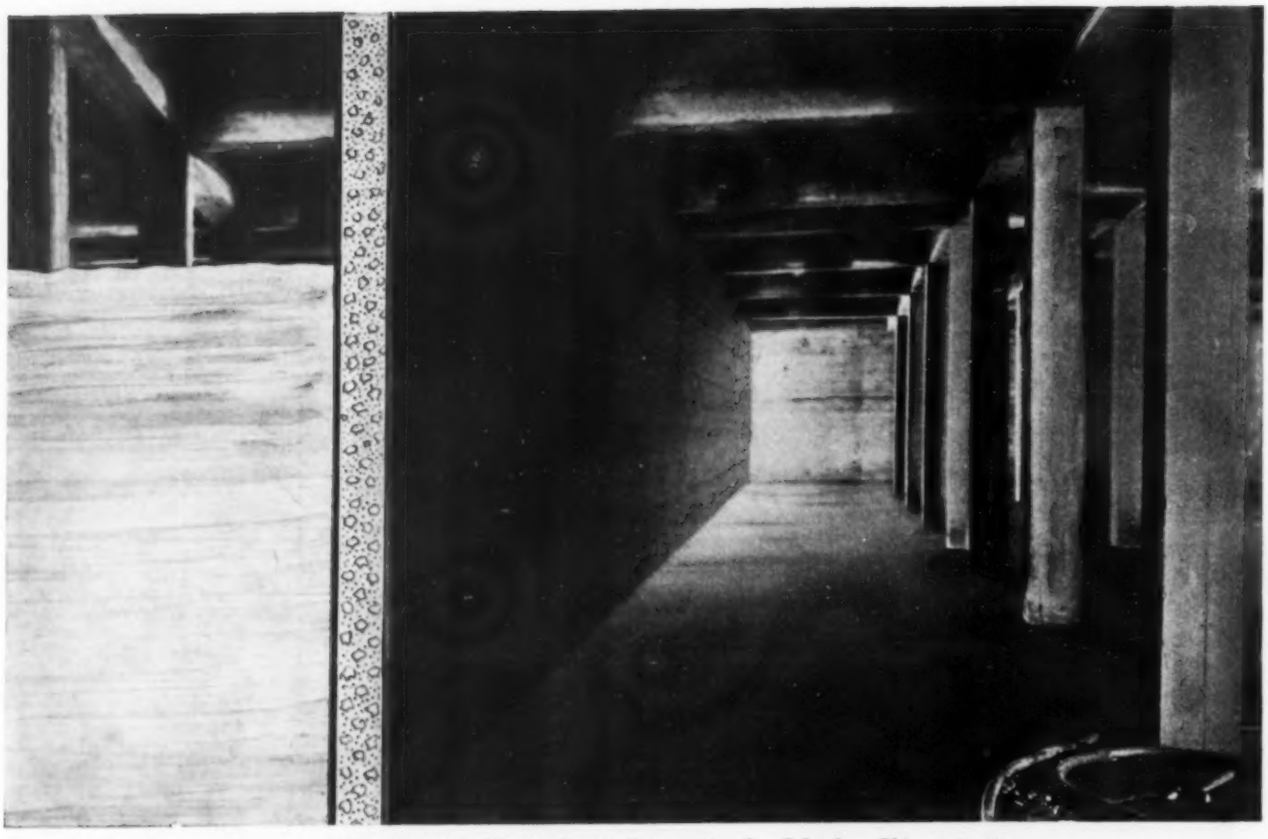


New reservoir at Kankakee, Illinois. Burnip Construction Co., Columbus, Ohio, contractor

A 12-foot head of water on one side, bone-dry on the other

In the new city reservoirs at Kankakee, Ill., the observance of the principles of modern concrete design insured more watertight concrete. The design for this concrete limited the amount of mixing water to seven gallons per sack of cement. Proper proportioning of local aggregates enabled the contractors to maintain a plastic, easy-to-place mix at all times. Collection of large quantities of water on the surface of the concrete during the placing operation was avoided and no laitance was permitted to form. After placing the concrete, the walls were kept damp to insure proper curing.

Such methods of mixing and placing do not increase costs. They result not only in increased watertightness but in stronger, more durable concrete as well. A booklet containing in detail these quality concreting methods and average results that may be expected with Universal or Atlas portland cement will be furnished on request.

Name .....

Address .....

UNIVERSAL ATLAS CEMENT CO.
208 S. LaSalle St., Chicago
Without obligation, please send me booklet containing in detail quality concreting methods. C. M. 6-31

72

CONCRETE FOR PERMANENCE

Universal Atlas Cement Co.

Subsidiary of United States Steel Corporation

Universal Atlas Cements

CHICAGO · NEW YORK · PITTSBURGH · MINNEAPOLIS · ST. LOUIS

Construction
Methods
A McGraw-Hill Publication—Established 1919
ROBERT K. TOMLIN, *Editor*
VOLUME 13 NEW YORK, JUNE, 1931 NUMBER 6

Prize-Winning Design for
ELEVATED TANK
of Steel Construction

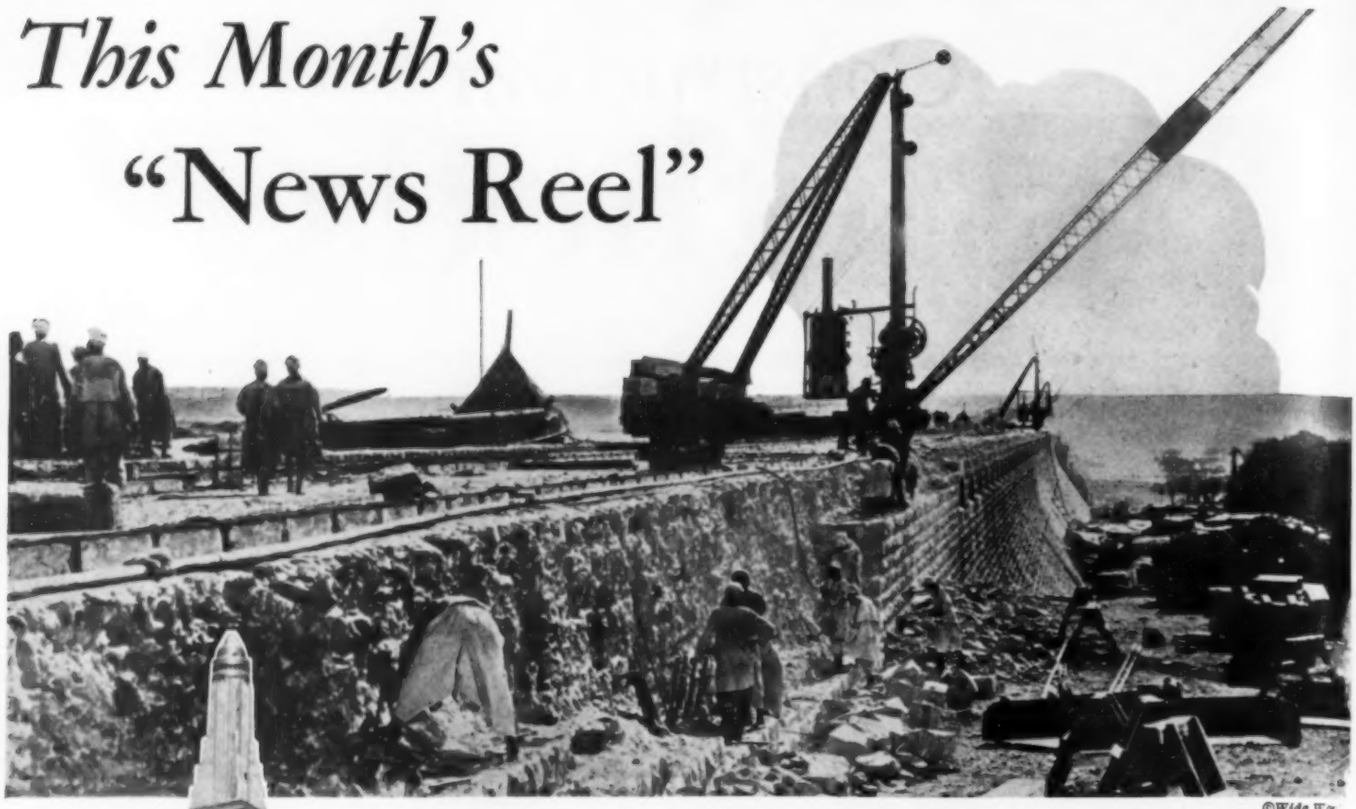
PRIZES totaling $4,000 have been awarded in a competition for improved design of elevated water tanks, sponsored by the Chicago Bridge & Iron Works. The structure which won the first prize of $2,000, designed by Eugene Voita, of Chicago, and illustrated herewith, is of steel, consisting of a tank holding at least 200,000 gal. of water between high and low water levels of 100 and 85 ft., respectively, above the ground, and supported by two rings of ten posts each.

For the posts H-columns or built-up sections can be used. The effect shown in the illustration is obtained by shaping eight steel plates and placing them around each set of posts. The tank bottom is coned slightly and is carried by radial girders resting upon the tops of pairs of posts and the central riser pipe. A spiral stairway around the riser pipe leads to a balcony just below the tank proper. The design provides a reasonable capacity for an average small municipality and the height is a common one to provide the necessary pressure in a city on fairly level ground. It will be noted that the predominating feature of the prize-winning design is the extension of the posts or columns up the sides and over the top of the tank to produce a unified structure.

The jury of award consisted of R. W. Zimmerman, architect, chairman; Howard L. Cheney, president, Chicago Chapter, American Institute of Architects, and George T. Horton, president of the Chicago Bridge & Iron Works. The competition produced 691 applications to participate and 152 final presentations of drawings.

STEEL CONSTRUCTION of prize-winning design provides for vertical posts, sheathed with light steel plates, extending up along sides and over the top of the tank, producing effect of unified structure.

This Month's
"News Reel"



©Wide World

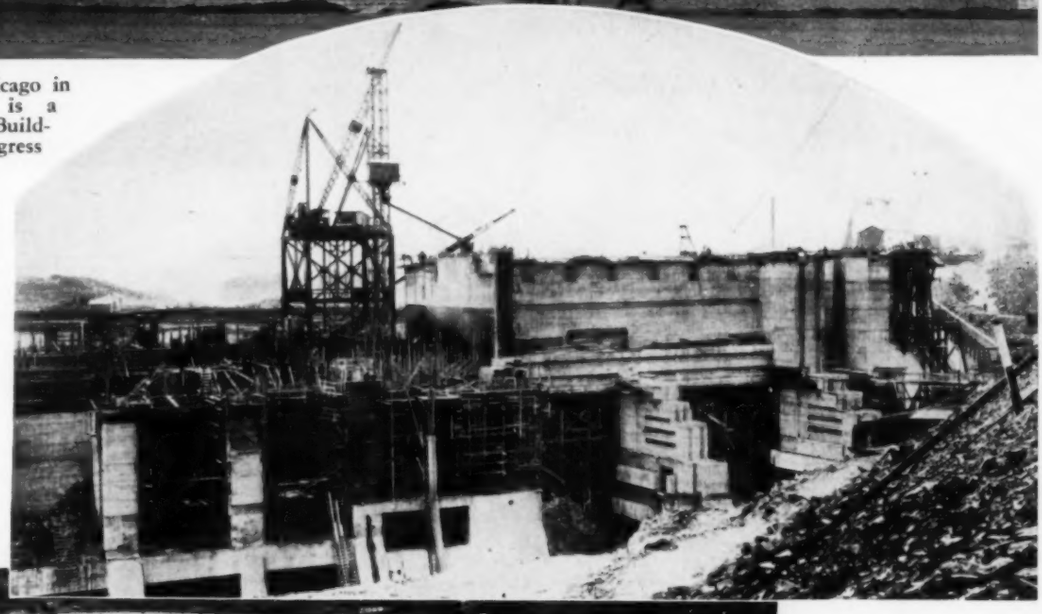
RAISING THE ASWAN DAM. Historic structure across River Nile, in Egypt, undergoes second reconstruction by English contractors to provide increased height of 30 ft. to store additional water for irrigation. Dam, begun in 1898 and completed in 1902, was originally 96 ft. high. A previous 16.4-ft. addition to its height was made in 1907.

©Keystone

OFFICIALLY OPENED FOR OCCUPANCY. Eighty-five story Empire State Building, world's tallest structure with tower extending to height of 1,248 ft., receives public May 1 when grandchildren of former Governor Alfred E. Smith pull ribbons unlocking main entrance.

©Wide World

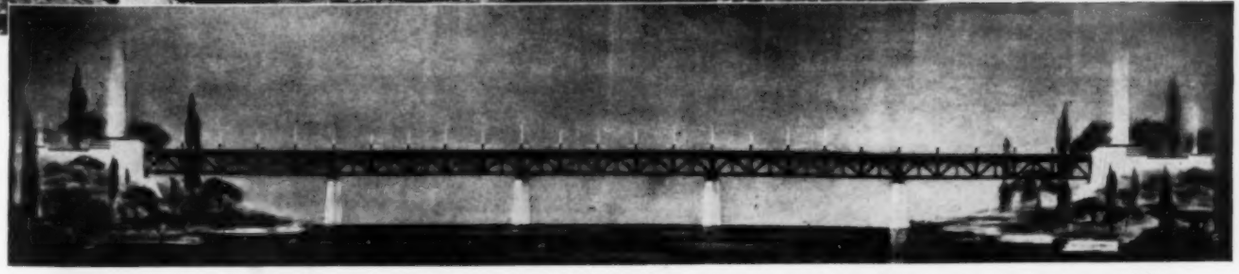
FOR WORLD'S FAIR in Chicago in 1933. Modernistic design is a feature of the Administration Building for the Century of Progress exhibition.



ROCK ISLAND PROJECT *(right)* will develop low-head hydro-electric power on Columbia River near Wenatchee, Wash., for Washington Electric Co., at estimated cost of $13,000,000. Construction by Stone & Webster Engineering Corporation, under direction of W. D. Shannon, manager, H. F. Anthony, project manager, and R. E. McGrew, superintendent. Concrete dam, with gate-controlled spillways, will be 4,400 ft. long and 108 ft. high.

NEW STADIUM *(left)* with seating capacity of 80,000 is completed at Cleveland, Ohio, in time for forthcoming heavyweight championship bout between Max Schmeling and W. L. Stribling. Frederick Snare Corp. built pile substructure and Bass Construction Company erected steelwork.

©*Wide World*



STEEL BRIDGE DESIGN WINS PRIZE. R. F. Weber, Chicago, wins $500 architectural student competition sponsored by American Institute of Steel Construction.

COLOR
BUILT INTO SKYSCRAPER

Horizontally Striped Facade on the New 33-Story McGraw-Hill Building Produced by Wide Bands of Blue-Green Terra Cotta Blocks Covering Spandrels at Every Floor

COLOR, in the form of wide horizontal bands of blue-green glazed terra-cotta blocks covering the spandrels at each floor level and forming a striped facade of striking appearance, is one of the outstanding architectural features of the new McGraw-Hill building, a 33-story and penthouse structure, 488 ft. high from curb to roof, which is being completed at 330 West 42nd St., New York, to house *Construction Methods* and the other McGraw-Hill engineering and industrial publications. The building, for which Raymond Hood, Godley & Fouilhoux, of New York, were the architects and Starrett Bros. & Eken, Inc., the contractors, occupies a ground area of 27,946 sq.ft., with a frontage of 130 ft. on 42nd St., 153 ft. 2 in. on 41st St., and a depth of 197 ft. 4 in. from street to street.

Setbacks—Setbacks occur at the seventh, eleventh, sixteenth and thirty-second floor levels, with tanks and elevator machinery enclosed by a penthouse forming the top of the structure. The main tower of the building, starting at the sixteenth floor, is 90x130 ft. in plan and extends to the thirty-second story, where the final setback occurs. The thirty-second and thirty-third floors, 130x69½ ft. in plan, will be used for executive offices and a large conference room in which columns are eliminated by the use of heavy trusses.

One of the major considerations in planning the building was to provide a well lighted interior for the company's printing and publishing activities. The result is a maximum of glass inclosure by windows that take up virtually the entire wall space of every story.

The vertical elements of the facade—piers and mullions—are painted green-black, thus creating a two-tone effect with the horizontal bands of lighter blue-green terra-cotta forming the spandrel facing. Another contrasting element of color is introduced by painting the narrow horizontal bars of the steel window sashes light green.

The steel frame of the building, as designed by Lockwood-Greene Engineers, Inc., is of the type common in skyscraper construction except that the wind bracing is heavier than usual for structures of this kind and extra heavy loadings and thick concrete slabs are provided for on those floors that will carry the printing presses and other mechanical equipment of the company's production department.

A. H. PETERSON, superintendent for Starrett Bros. & Eken, Inc., building contractors.

Floor Loadings—For the second to eighth floors, inclusive, the total floor loading is 349 lb. per square foot, made up of a live load of 250 lb. per square foot and a dead load of 99 lb. per square foot, the latter comprising 72 lb. for an 8-in. cinder-concrete floor slab, 15 lb. for a 3-in. cinder fill and 12 lb. for a 1-in. cement floor finish.

From the ninth to the thirty-first floors, inclusive, the total floor load is reduced to 189 lb. per square foot, consisting of a live load of 120 lb. per square foot and a dead load of 69 lb. per square foot, made up of 36 lb. for a 4-in. cinder-concrete floor slab, 15 lb. for 3-in. cinder fill, 12 lb. for a 1-in. cement floor finish and 6 lb. for plaster.

Story Heights—Story heights vary from 12 ft. for the tower section of the building, starting at the sixteenth floor, to a maximum of 15 ft. 10 in. for the sixth to eighth stories. The steel columns, fabricated in two-story lengths, are Carnegie beam sections, seated on I-beam grillages carried by reinforced concrete piers. For the central or tower portion of the building the bays between columns are 21 ft. 10 in. by 18 ft. 2 in. The cinder concrete floor slabs, reinforced with wire mesh, are carried by a system of I-beams with riveted connections. Except for those floors carrying the heaviest loads the girders are usually 22 in. and the floor joists, 14 in. deep.

After the excavation had been completed under a subcontract by the

STEEL ERECTION GANG which constructed 7,800-ton frame of 33-story structure in a little more than three months.

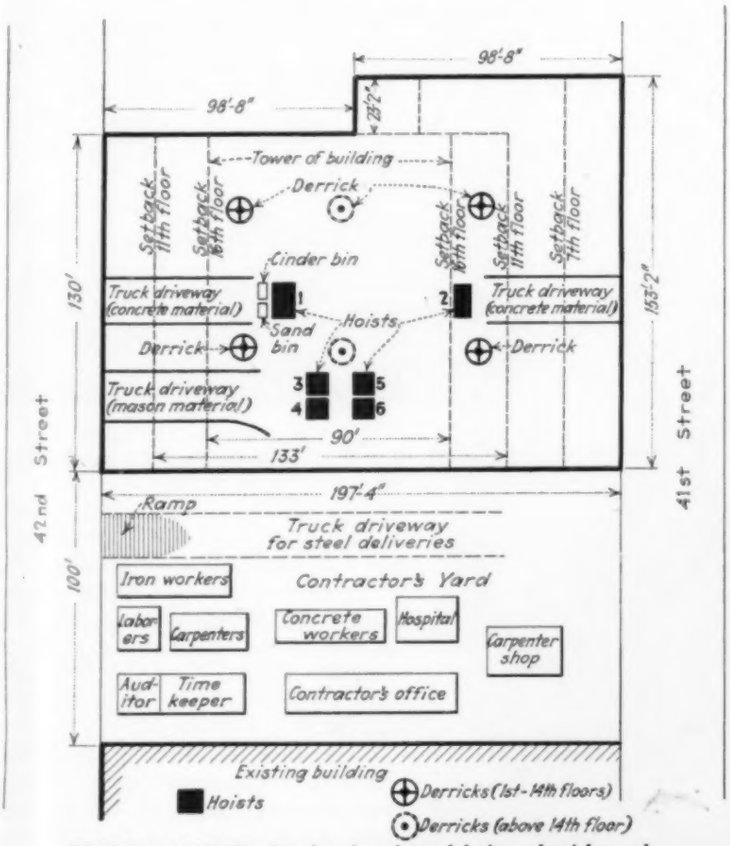
George J. Atwell Foundation Corp., Inc., Starrett Bros. & Eken, Inc., building contractors, of New York, undertook all of the steel erection, terra cotta and brick masonry work with its own forces.

Steel Erection—The frame of the building called for the erection of 7,800 tons of steel fabricated by the American Bridge Co. The first column was set Dec. 28, 1930, and the last rivet in the 33-story steel frame was driven April 9, 1931.

Steel erection was handled by four guy derricks having 80-ft. masts and 90-ft. booms. With a five-part line hoisting speeds were 75 ft. per minute. A start was made with two derricks along the south side of the plot and as soon as all of the column footings had been finished two more derricks were installed along the north side. Three of the derricks were of 10-ton and the fourth of 15-ton capacity. These four derricks, spotted as shown in the accompanying sketch, were used to set steel for the first 14 floors of the building. At that point, just below the level where the setback occurs for the main tower, two of the derricks were dismantled and removed, the remaining steel up to the penthouse level, including that in the 90x130-ft. tower starting at the sixteenth floor, being handled by only two derricks.

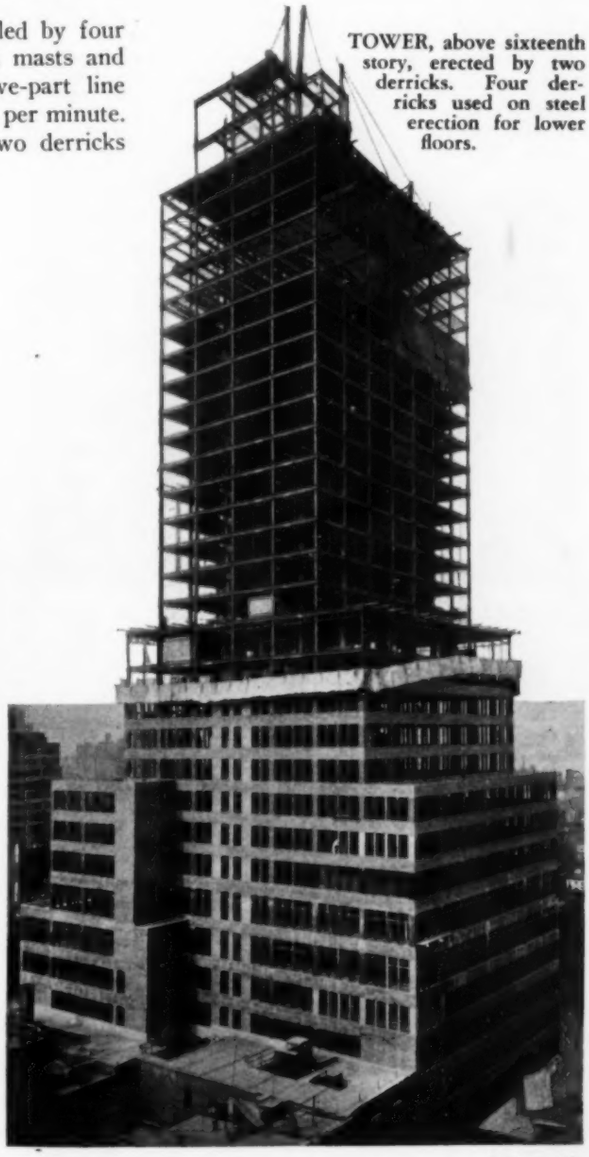
During the first phase of the steel erection the hoisting engines serving the four guy derricks were located in the basement; later they were transferred to the twelfth floor after the number of derricks had been reduced from four to two.

An important factor that A. H. Peterson, general superintendent for



PLANT LAYOUT, showing location of hoists, derricks and contractor's yard.

Key to hoists: (1) Concrete bucket, 1 yd. to 31st story. (2) Three-wheelbarrow (concrete) to 16th story. (3) Two-wheelbarrow (brick) to roof. (4) Three-wheelbarrow (terra cotta and tile) to penthouse. (5) Mortar bucket, ¾ yd., to 32nd story. (6) Subcontractors' hoist (lumber, etc.) to 32nd story.



TOWER, above sixteenth story, erected by two derricks. Four derricks used on steel erection for lower floors.

the Starrett organization, took into consideration in planning the steel erection and determining the number of derricks necessary to maintain the progress schedule, was the location along the west side of the building of a vacant lot nearly 100 ft. wide, extending between 41st and 42nd Sts. and acquired with the rest of the land for the building site. Seldom during the course of skyscraper construction in midtown New York does a contractor enjoy the good fortune of having the use of an open space of this sort for hoisting steel and handling materials.

Full advantage was taken of this vacant plot of land by installing a truck driveway with ramp from 42nd St. and using this area for delivering and hoisting steel for the tower of the building. On this side of the structure there are no setbacks and consequently

COLUMN ERECTION near top of structure. Note riveted seats for floor girder connections *(above)* and heavy weight block *(below)* on five-part line from guy derrick.

BELLMAN operates pair of lines to signal guy derrick hoist runner.

CONNECTORS swing heavy two-story column into place for bolting up.

the necessity for installing relay derricks at upper floor levels to handle the steel was avoided. Trucks arriving with steel proceeded down the driveway ramp and were spotted under the boom of one of the guy derricks on top of the structure. With this derrick steel was raised to the top in a single lift, without rehandling at intermediate floor levels. This practice not only expedited deliveries of steel to the erectors on top but also introduced an element of safety, for all loads for the upper stories were hoisted over the private driveway in the vacant lot and not over 41st or 42nd Streets, always crowded with vehicles and pedestrians. Mr. Peterson states that the use of this vacant lot saved at least one derrick, in addition to eliminating the hazards involved in raising heavy loads of structural members over congested streets.

Another important advantage was gained by utilizing the vacant lot for the location of the contractors' field office, workers' shacks, air compressor plant, and carpenter shop equipped with a power saw for cutting concrete form lumber. Space was available on the lot, also, for storage of materials.

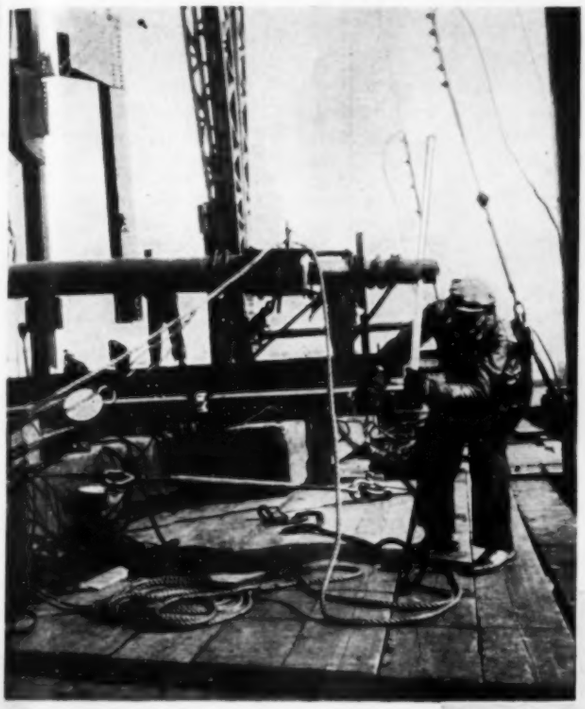
When the shift from four to two derricks was made after the steel frame for the fourteenth story had been erected, the 15-ton derrick was set up along the west side of the building and raised all of the steel for the remainder of the structure directly from the trucks making deliveries along the vacant lot driveway. Each derrick was guyed with eight cables and by a system of marking and sorting the steel members, in charge of T. Shearman, of the Starrett organization, each derrick load was deposited on top of the structure in a predetermined sector of the derrick circle, thus expediting the work of the steel erectors.

With four derricks in use, steel erection, in charge of John F. High, steel foreman, with E. C. Maxwell resident engineer for Lockwood-Greene supervising the work, was handled by four raising gangs of seven men each, including one pusher, one bellman, one bull-stick man, two

hookers-on, and two connectors. In addition there were two bolters-up, who, among other duties, adjusted lintels which were bolted to line up with the brick work. Average progress in steel erection was about 500 tons per week, with a maximum of 1,298 tons during one week.

the connections on the intermediate floor were riveted. This practice was followed in order to provide a stiff, accurately plumbed structure for the raising floor carrying the derricks. Both the raising floor and the floor below it were kept thoroughly planked at all times to make it easy and safe for the steel erectors and riveters to move about on the job.

Derricks were "jumped" two floors at a time by disconnecting the boom and using it to raise the mast to its new position on a grillage of 20x20-in. yellow pine timbers. The derrick jumping operation required only about

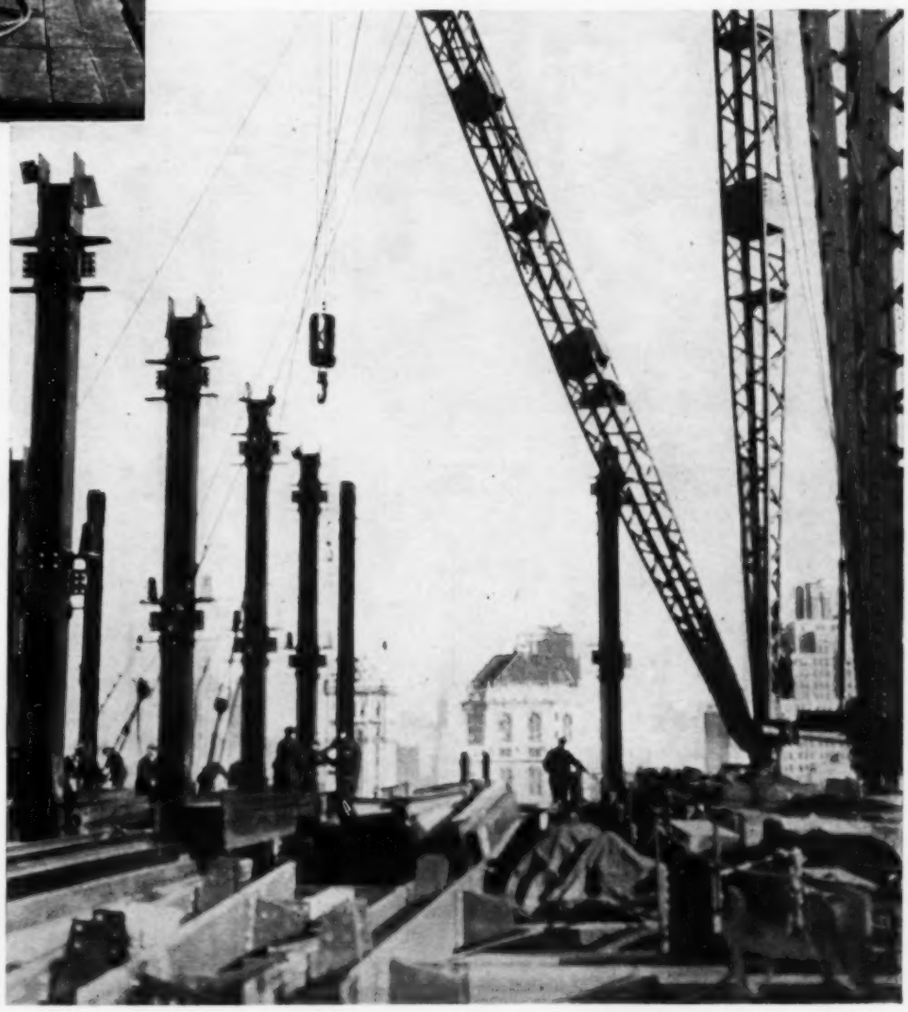


BULLSTICK MAN *(above and at left)* **rotates guy derrick by tackle and capstan device. Note thorough planking of raising floor, at left.**

Riveting was done by ten 4-men gangs (heater, passer, gunman and bucker-up) under the direction of Paul Rockhold, riveting foreman. For bucking-up during the driving of a rivet, air jacks were largely used. Each gang averaged about 600 rivets per 8-hour day. The structural design of the steel frame is characterized by heavy wind bracing and some connections required the driving of 109 rivets. For the most part connections were made with $\frac{7}{8}$-in. rivets, with $1\frac{1}{8}$-in. rivets also used.

The riveting hammers were supplied with air from a manifold connected by a hose to a $2\frac{1}{2}$-in. vertical riser pipe extending up through the building from an electrically-driven air compressor at ground level. Air pressures were about 100 lb. per square inch at the compressor and 90 lb. per square inch at the hammers. During cold weather alcohol was fed into the air receiver to prevent freezing.

Columns in Two-Story Lengths—Columns, of which the heaviest weighed $19\frac{1}{2}$ tons, were fabricated and erected in two-story lengths. After all floor beams had been connected up, riveting was always begun and finished on the upper story first. Afterward,



COLUMNS, with floor girder connections, are fabricated and erected in two-story lengths. Heaviest column weighed $19\frac{1}{2}$ tons.

a couple of hours. As the building rose in height the hoisting cables on the derricks were lengthened by making field splices. As much as 3,800 ft. of cable were required on a derrick hoist drum. With this amount of cable to be handled, the load line was rigged with a heavy weight-block (3,300 lb.), thus avoiding the necessity of auxiliary weights on the load hook.

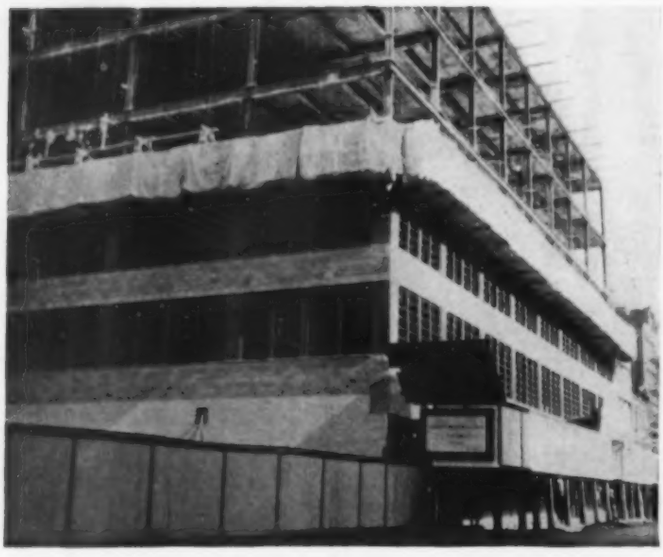
Due to regular deliveries of steel in proper quantities, systematic sorting of the structural members, direct hoisting to the top without rehandling by relay derricks, good organization and a high grade of personnel in the raising and riveting gangs, Superintendent Peterson, assisted by H. R. Root, project manager, was able to turn over the 7,800-ton completed framework for the 33-story structure just a little more than three months after the first column was set upon its footing Dec. 28, 1930. During the course of the steel erection no serious accident happened to any worker and no structural member was dropped.

A special detail in the steel frame was required at the top of the building where there is a conference room, unobstructed by columns, on the thirty-third story. Here steel trusses were

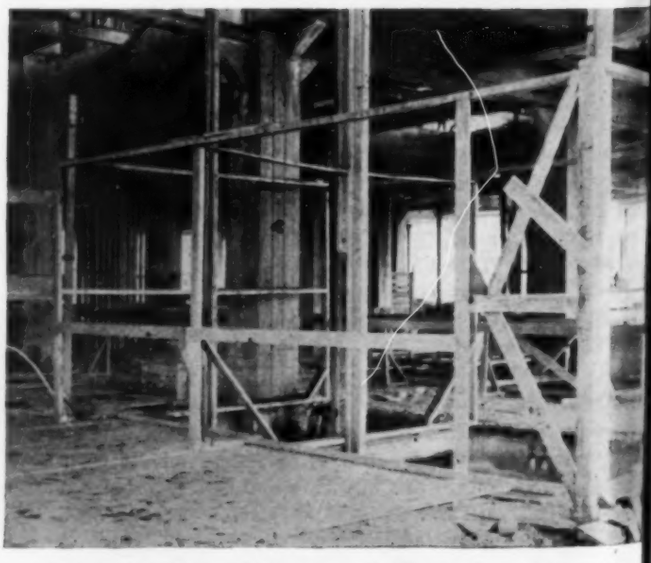
RIVETING CREW makes column splice on one of the upper stories. Air jack used for bucking up.

TIMBER GRILLAGES *(left)* of 20x20-in. yellow pine support guy derricks on raising floor.

SAFETY *(right)* is assured by wide, strong double ladders and adequate planking on working floors.



TERRA COTTA BLOCKS, blue-green in color, are used as facing for spandrels at each floor level.



HOISTWAY OPENINGS are guarded by timber barriers with safety gates at each floor landing.

built up in place to support the penthouse. Prior to the erection of the trusses temporary timber bents were set up to support the penthouse structure, as it was not feasible to fabricate and raise the heavy trusses to place as units.

Hoists—An important part of the preliminary job plan was a decision as to the number and the location of the hoists for handling concrete for the floor slabs, reinforcing steel, brick, mortar, terra cotta, form lumber, piping, steel window sash and the other materials entering into the construction of the building. Trucking entrances to the building from both the 41st and 42nd St. sides were established and a total of six electrically operated hoists installed, three of them used principally for the tile, terra cotta and brick masonry work and three for the concrete floor slabs and column covering. In addition, two 1-yd. mixers were set up in the basement to supply concrete for the floor arches and one ½-yd. mixer was installed to provide mortar for the masonry work.

As indicated in the skietch on p. 33, hoist No. 1, served by the 42nd St. entrance, was equipped with a 1-yd. bucket and was used principally by the sub-contractor on the floor arches, the Knickerbocker Fireproofing Co., for delivering concrete from a mixer in the basement up to the thirty-first floor. Hoist No. 2 opposite the 41st St. entrance was a three-wheelbarrow unit, also used mainly for concrete; this unit was located outside the lines of the main tower of the building and operated only up to the sixteenth floor of the building.

STRIPED FACADE produced by facing spandrels with horizontal bands of glazed terra cotta block, blue-green in color.

The four other hoists were located in a group near the west wall of the building in shafts provided for elevator service at some future date if the needs of the building demand it. No construction hoists, however, were permitted in any shafts designed for elevators to serve the building immediately after its completion and occupancy.

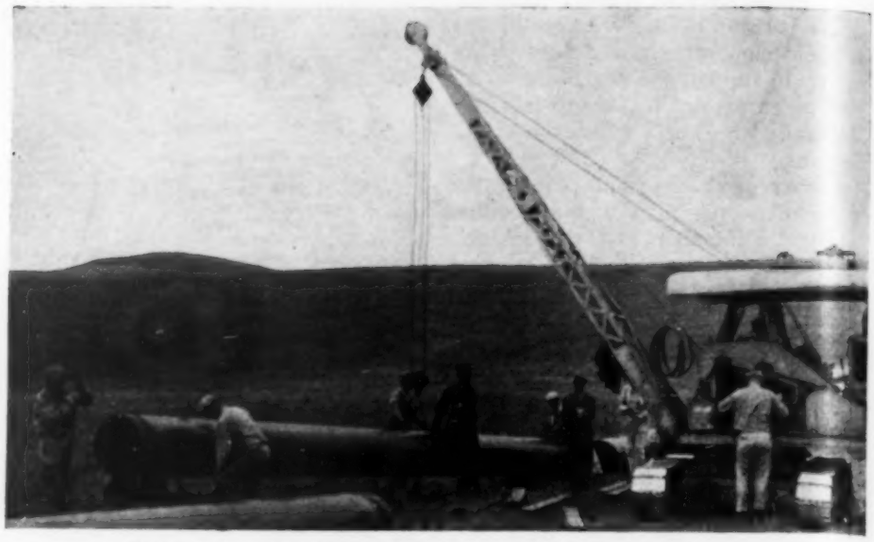
Of the four construction hoists above noted No. 3, extending the full height of the building, was a two-wheelbarrow unit for brick; No. 4, accommodating three-wheelbarrows, carried interior partition tile and terra cotta blocks for the facade of the building up to the penthouse level; No. 5, serving all floors up to the thirty-second, was equipped with a ¾-yd. bucket for mortar, mixed by a machine in the basement. No. 6 was a hoist installed principally for subcontractors' use and was operated on an hourly rental basis; it was carried to the thirty-second story and handled lumber, wire mesh reinforcement, piping and other installation materials. This group of four hoists was served by a second truck driveway from the 42nd St. front of the building.

(The second part of this article, to appear next month, will describe the concrete and terra-cotta masonry work on the McGraw-Hill building.)

TIMBER FALSEWORK supports penthouse structure pending erection of heavy steel trusses to eliminate columns in top-floor conference room.

WINDOW DETAIL, showing shelf-angle attached to lower flange of spandrel I-beam to support terra cotta block facing and form lintel.

Pipe-Line Men Improve Methods of Constructing



ALIGNING PIPE LENGTHS in pairs for tack-welding. Buckeye 5-ton crawler crane handles pipe.

Large Gas Transmission Mains

Part I

Welding and Enameling Pipe

INCREASE in size of gas transport mains has made it imperative that contractors develop efficient methods of building large-diameter pipe lines of great length. Costs of handling pipe in the field have become more important as diameters have increased to 24 in. Operations on large pipe, such as applying protective coating and bending, are likely to take an excessive amount of time and labor. Pipe-line builders are seeking and developing more economical methods of performing field operations.

Although there is great variation in specifications (even for contract sections of the same pipe line), the fundamental operations and difficulties are common to all sections. This article

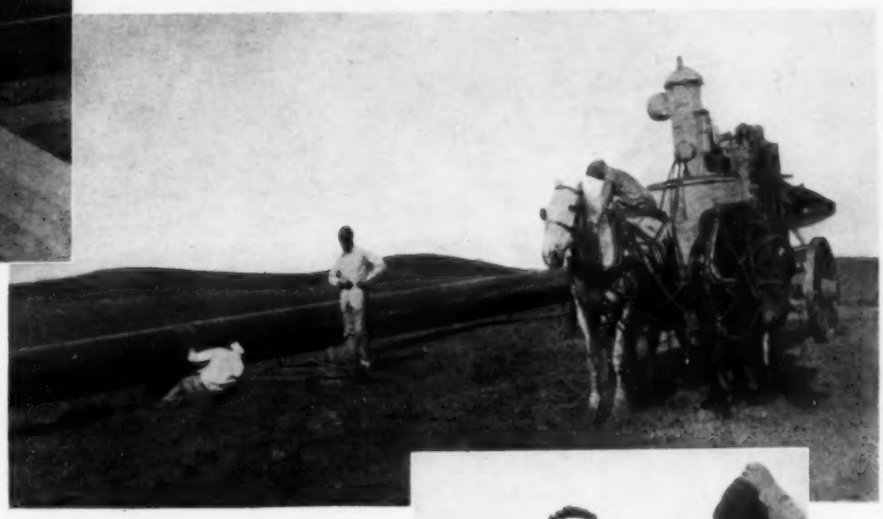
CHILL DAM is installed in end of one pipe length preparatory to connecting two lengths and welding joint. Chill dams are used in welding pipe more than 12 in. in diameter. For oxyacetylene welding of 24-in. pipe, chill dam is ring 2 in. wide and about ¼ in. thick, with shallow circumferential depression around center. In this depression, on center line of ring, are six short radial stubs, or spikes, of ¼-in. wire, which come between two pipe ends and space them properly for welding. Heat of welding causes ring to expand, forcing depression up against pipe. Chill dams used for electric welding are of slightly different design; but they also carry spacing rings.

AFTER PIPE HAS BEEN STRUNG along right-of-way, Williams Bros., Inc., cleans inside of pipes, places chill dams, and tack-welds 40-ft. lengths into 80-ft. sections. Swab, on long rod, is pulled through pipe by horse to loosen scale from corroded surface. Workmen then crawl through pipe and brush out all loose material.

END OF SECOND PIPE is slipped on to chill dam as workman aligns pipe for tack-welding.

TACK-WELDING JOINT *(below)* between two pipe lengths. Williams Bros., Inc., has one Oxweld acetylene generator outfit for tack-welding and four for girth-welding. Wagon carries bottled oxygen.

TACK WELDS *(in lower photograph)* are made at six points around 24-in. pipe. These points coincide with spacing stubs on chill dam, each weld covering one stub.

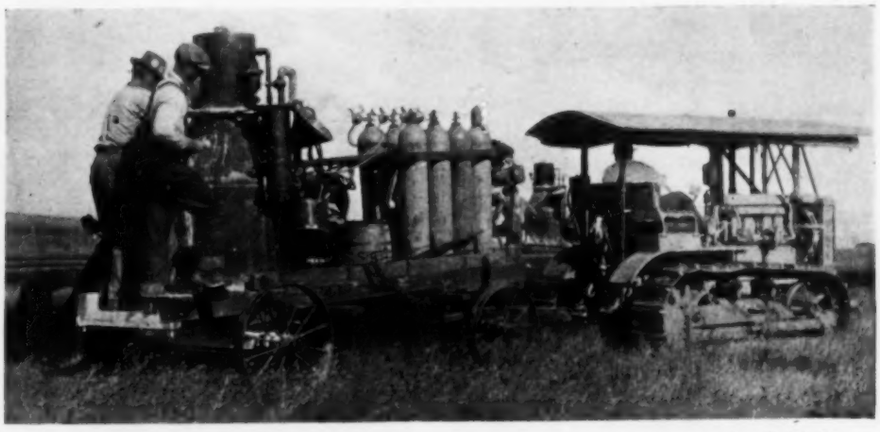


and the two succeeding it present pictorially some typical methods of constructing 24-in. gas mains.

Two mains from the Texas Panhandle to Illinois and Indiana have practically been completed. The Continental Construction Co., owned by a number of large oil companies, has built a line from the Panhandle to Chicago—practically all of it 24 in. in diameter. This line will be the first gas transport main to operate under 800-lb. pressure. About 350 miles of the second main, owned by the Missouri-Kansas Pipe Line Co., is 24-in. pipe.

Field Organization—Contract sections on the two lines range from 100 to 200 miles in length. Construction of these great lengths of main at an average rate of about a mile a day requires a mobile, flexible and fast-moving field organization. This series of articles covers work on four contract sections which were under construction by two companies, Smith Bros., Inc., of Dallas, Tex., and Williams Bros., Inc., of Tulsa, Okla. The

HELPER TURNS PIPE with chain wrench while welder completes girth joint. Oxyacetylene welding of 24-in. pipe joint requires 75 to 80 min. Minimum time specified by Continental Construction Co. is 75 min. On 24-in. pipe, of 5/16-in. thickness, 7½- to 8-lb. pressure of acetylene and oxygen is sufficient. With National torches, one charge of 130-lb. generator will make twelve girth welds of 24-in. pipe. Thicker pipe requires higher gas pressures. Smith Bros., Inc., on this contract, averages five joints per welder in 9 hours. Crew of fifteen or sixteen welders makes 70 joints on an average day. High record is 85 in one day.



OXYACETYLENE OUTFIT of Smith Brothers, Inc., moves to new location behind tractor. Crew of fifteen or sixteen welders is equipped with five Imperial generators having capacity of 130 lb. of carbide and with one generator of 50-lb. capacity. Larger generator can supply gas to four National torches.

PRIMING GANG *(left)* cleans pipe with wire brushes and applies cold prime coat. Williams Bros., Inc., crew of 24 men, including one teamster, cleans and primes about 4,800 ft. a day. Prime coat must be perfectly dry before Wailes-Dove-Hermiston bitumastic enamel can become bonded to it.

CLEANING AND SMOOTHING welded joint before applying prime coat. Workmen use chisels and files to prepare welds for painting.

two contractors may be accepted as representative of the most successful pipe-line builders.

Efficient management of extensive field operations requires that the contractor's organization be divided into a number of gangs, each of which specializes in a certain phase of the work. These gangs may include: right-of-way, pipe stringing, welding, painting (or pipe covering), machine ditching, hand ditching (in rock), creek crossing, and laying and back-filling. Activities of some gangs are evident from the names: Right-of-way, for instance, clears the ground behind the locating party; the pipe-stringing crew distributes pipe along the right-of-way, and the creek crossing gang digs the trenches and places the pipe under streams which are not large enough to require special, multiple-main crossings. This article relates to the work of two important crews, the welding and the pipe covering. Next month's article will describe bending and laying, and

PREPARING FOR ENAMELING. Tractor with boom attachment places each end of pipe section on rollers. Wailes-Dove-Hermiston Corp. rents rollers with chain-and-sprocket drive for operation by men turning double crank. Contractors have substituted power drive for manual operation.

POWER DRIVE *(right)* to revolve 80-ft. pipe section during painting operation is supplied through shaft from take-off on McCormick-Deering tractor. Shaft is telescopic and is equipped with universal joint at each end, making quick connection easy.

TRACTOR REVOLVES PIPE *(above)* while pourer and pad man spread coat of hot enamel. Williams Contracting Co. developed power drive to supplant hand operation by six men on double crank. Using old method, crew of 27 men, including two teamsters, averaged about 3,000 ft. a day and applied uneven coat. With tractor drive, same crew paints mile or more a day and obtains even thickness. Smith Bros., Inc., uses air motor to turn pipe.

LATER DEVELOPMENT *(left)* eliminates pad man. Smith Bros., Inc., uses pouring pot equipped with spreader which applies solid coat of enamel 1/16 in. thick in continuous spiral as workman walks along revolving pipe. Williams Bros., Inc., regulates thickness of enamel by speed of revolving pipe. Speed of 20 r.p.m. gives correct thickness. Temperature of enamel when drawn from kettles is 450 to 475 deg. F.

the third of the series will portray methods used in making a multiple-main river crossing.

Welding—Both the Continental and the Missouri-Kansas pipe lines specified that welded girth joints should be alternated with Dresser couplings. Although electric welding was considered preferable by the contractors for pipe lines over 12 in. in diameter, oxyacetylene welding was used for a great portion of the work. Reasons for using oxyacetylene welding were familiarity with the method and availability of trained crews. Two divisions of the welding crew operated in the field, one aligning and tack-welding the pipe, and the second completing the full girth welds.

Protecting Pipe—Pipe-covering operations illustrated by the accompanying photographs are those employed in applying Wailes-Dove-Hermiston bitumastic enamel. The gang performing this part of the work was divided into a crew for applying the prime and a second crew for putting on the hot enamel. Additional protection is provided in rock and hard clay soils by covering the enamel with Johns-Manville felt wrapping.

WHITEWASH applied to coat of enamel while still warm helps to cool and harden enamel. White covering protects black enamel from effects of sun and prevents grass, stones, or other material from sticking to surface and becoming embedded when pipe is placed in ditch. Whitewash material is exhausted carbide solution from acetylene generators.

PIPE WRAPPING *(left)* of Johns-Manville felt is used instead of whitewash to give additional protection in rock and hard clay.

NEXT MONTH

Additional details on bending and laying large gas pipe lines.

DISPOSAL OF SPOIL AND

Feature Work on

GANTRY TRAVELER of welded structural steel expedites placing of riprap across broad bottom of channel. CARRIAGE *(right)*, running on lower flanges of channels, delivers skip-loads of rock from bank to any point under runway, which extends to cantilever end.

TWO major problems faced R. J. Blackburn, Inc., contractor for Section H of the River Des Peres storm-water sewer, St. Louis. Removal of a naturally unfavorable material was complicated by restrictions as to the disposal of spoil, and a spongy river bottom made paving with rock a difficult operation. Capable management, aided by a dry working season, carried the job to a successful conclusion by applying equipment of standard and special design to the various operations.

Construction Conditions—Section H of the River Des Peres storm-water sewer is an open ditch, 16,350 ft. long. The bottom is 150 ft. wide for 5,900 ft. of this distance; the width for the remainder is 140 ft. Side slopes are 1 on 2, and depth of cut ranges from 20 ft. to 36 ft. Construction of the new canal involved a number of channel changes. The old River Des Peres followed a meandering course.

For about half its length, Section H lies above a 7-ft. four-ring, brick, foul-water sewer. The contractor had to reinforce 353 ft. of this sewer and to construct numerous extensions and interceptors from 6 in. to 63 in. in diameter. To compensate for this interference with the regular River Des Peres work, the foul-water sewer provided drainage for the river flow. Because of the dry season, the contractor was able to pass all the River Des Peres water into the sanitary sewer by opening holes through the brick crown. In addition to reconstruction of the brick sewer, the contract included 1,000 ft. of 20-ft. reinforced concrete sewer.

Four street bridges and a railroad bridge crossed the channel. Steam shovels, loading into narrow-gage cars or trucks, had to be employed to excavate under the bridges. Side slopes under the structures were changed to 1 on 1½ and were paved with riprap to the top.

Excavation of material was rendered difficult by the nature of the soil. Although 1930 was almost free from the disastrous floods which have made the River Des Peres a treacherous enemy of sewer contractors, the mud bottom of the river did not change its characteristics. When this mud is wet, it becomes very sticky and cohesive; after the material has partially dried out, it fluffs and swells to much greater than normal volume. If just wet enough for satisfactory handling, 7 yd. of the mud can be loaded into a 5-yd. dump car.

Disposal of Spoil—Plans of the Board of Public Service of the City of St. Louis required that material

PLACING OF RIPRAP

Drainage Canal

excavated from Section H of the River Des Peres be used to bring surrounding property, such as proposed streets and parks, to grade of future development. This requirement imposed unusual restrictions upon the contractor in disposing of spoil. Railway equipment, working on conjunction with light, crawler draglines, provided a flexible means of distributing material wherever desired.

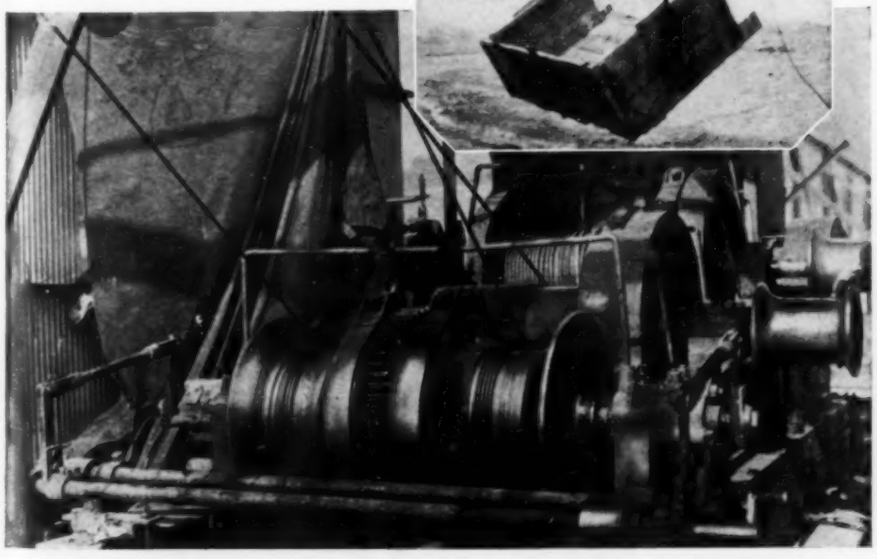
Excavators — Earth excavation amounted to a total of 2,344,000 yd., with 87,800 yd. of limestone rock in addition. A great part of the earth excavation could be removed and disposed of in one operation by long-boom draglines. To take care of this portion of the excavation, the contractor purchased three Monighan walking draglines: a 6-yd. machine with a 135-ft. boom, a 4-yd. with a 110-ft. boom, and a 2-yd. with a 70-ft. boom. These draglines were diesel-powered.

A battery of eight, gasoline-powered crawler draglines sloped the banks and loaded railway cars and trucks with the spoil which had to be hauled any distance. This battery consisted of four 1¼-yd. Northwests, two 1½-yd. Link-Belts, and two ¾-yd. P. & H's. All the draglines on the job, of both walking and crawler types, were equipped with Owens or Williams buckets.

For hauling from the smaller draglines the contractor had 36-in. gage railroad and eighteen dump trucks. Three Plymouth gasoline dinkeys, a 14-ton, a 12-ton, and an 8-ton, and a Whitcomb 8-ton gasoline locomotive operated trains of 5-yd. dump cars. The job was equipped with thirty of these cars, Western, Koppel, and Continental being represented. Among the dump trucks were Internationals, Packards, Macks and Fords.

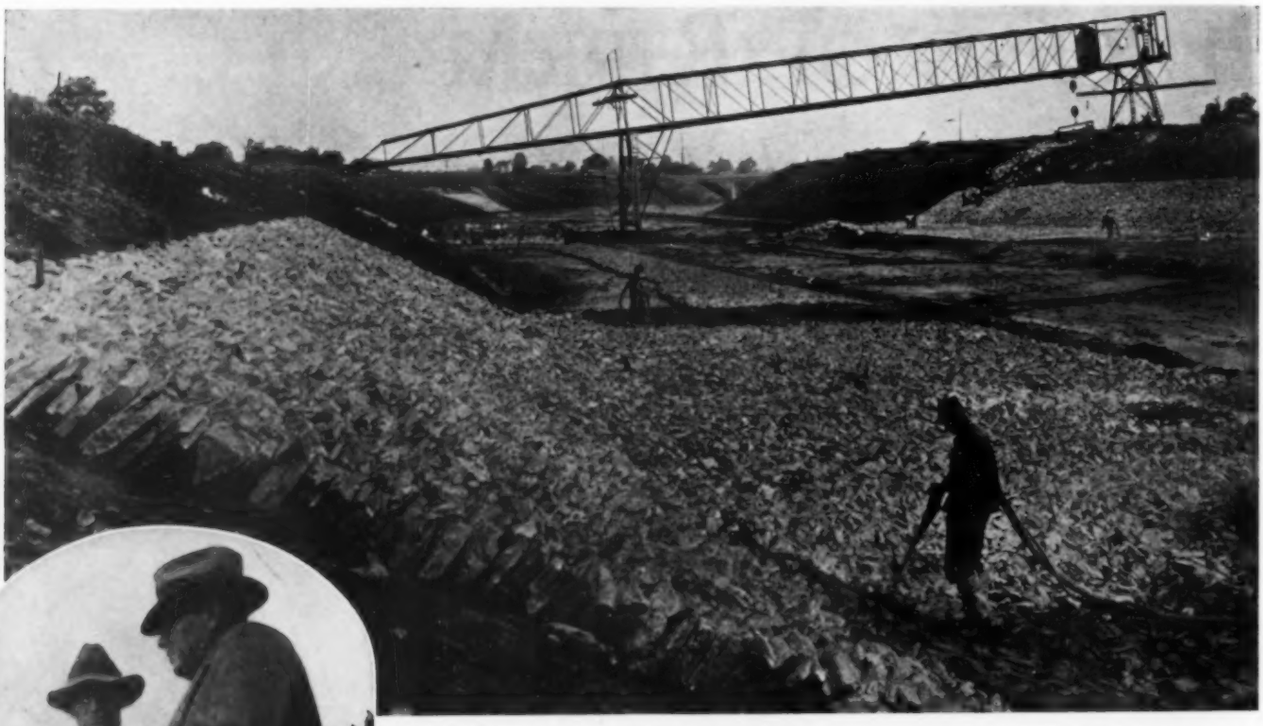
Rock excavation was concentrated near the center of the section. A Sullivan air compressor, of 1,200 cu.ft.-per-minute capacity, delivered air to a 6-in. pipe 3,000 ft. long, with a 2-in. connection every 200 ft. This pipe line supplied air for drilling the total quantity of 80,000 yd. of rock. During one month the contractor used two tower cableways with 800-ft. spans to remove excavated rock. The wood towers of these cableways were 104 ft. high. Using twelve Lakewood 2-yd. rock skips for loading in the pit, the tower cableways moved about 15,000 yd. in this one month.

BOARD MAT on soft channel bottom facilitates placing of riprap. Hand gangs lay rock at slower rate without aid of gantry. SKIP *(left)*, on gantry, carries 5-yd. load of rock.



TWO PONY DRUMS of hoist engine on gantry operate carriage, on continuous rope, in either direction.

Riprap—Placing rock riprap over the broad bottom and side slopes on soft, unstable material presented a difficult problem. It was necessary to find a means of delivering the riprap to the river bottom and of supporting it on the mud after it had been placed. The first part of the problem was solved by building a traveling gantry 265 ft. long, with an effective reach of 220 ft. Both legs of this gantry traveled on steel rails, one leg being



COATING OF GUNITE is applied to 1,709,000 sq.ft. of riprap. Contractor rents five cement-gun machines for this work.

J. G. TRIPP *(left)*, general superintendent, and R. J. BLACKBURN, president, R. J. Blackburn, Inc.

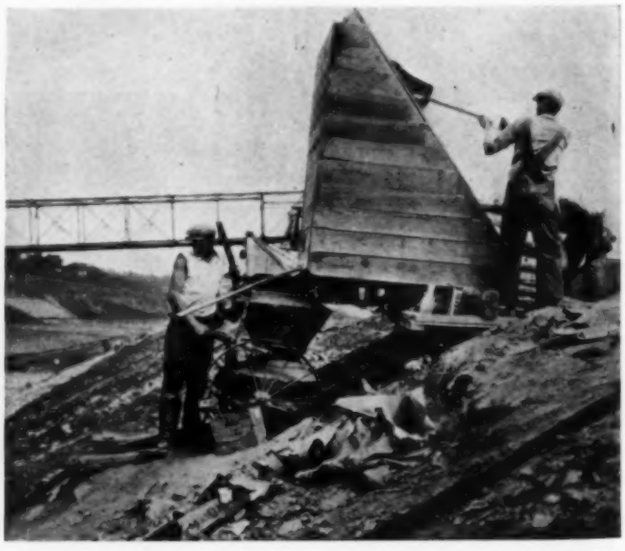
supported on the bank and the other on the river bottom, as illustrated by the photograph. To carry the placed rock on the soft mud of the river bottom the contractor used a mat of light boards. The riprap was waterproofed with a coating of gunite.

A total of 1,709,000 sq.ft. of riprap was placed on the river bottom and on the side slopes to a vertical height of 10 ft. One gang with the gantry, and two gangs working entirely by hand, laid the riprap at the rate of 320,000 sq.ft. a month. Two shifts per day of the gantry gang, aggregating 19 hours, placed as much as 1,000 tons of rock, or 19,000 sq.ft. of riprap. The gantry gang and the two hand gangs, in the two shifts of one day, placed up to 25,400 sq.ft. It is obvious that the gantry traveler greatly expedited the placing of riprap.

The design of the gantry traveler is illustrated by the photographs. Each of its two trusses was an expanded I-beam with the top and bottom flanges connected by tension and compression members to form a Pratt truss. The connections were welded.

A National hoist, equipped with two main drums and two pony drums and driven by a 75-hp. Le Roi gasoline engine, operated the traveling carriage on the gantry and propelled the gantry itself. A continuous load line, passing across two sheaves on the carriage and attached to the lower end of the gantry, prevented movement of the carriage while a load was being raised. The carriage moved on wheels which rolled on the lower flanges of two steel channels, bolted to the bottom transverse beams of the gantry. Movement of the carriage in either direction was controlled by the two pony drums. A continuous hauling rope was reeved through a system of sheaves and around the two pony drums in such a way that the operator could move the carriage in either direction by applying power to the proper drum.

The gantry could handle a load of 5 cu.yd., or 7 tons, at the extremity of its lower, cantilever end, 220 ft. from the leg on the bank. Lifting speed of the single-sheave block on the two-part hoisting rope was 100 ft. a minute.



GUNITE MACHINE *(right)* at top of bank delivers material to cover riprap below. Portable compressors are used at most set-ups of machines. On portion of job, 3,000-ft. pipe from main compressor plant, installed for rock drilling, supplies air for guniting.

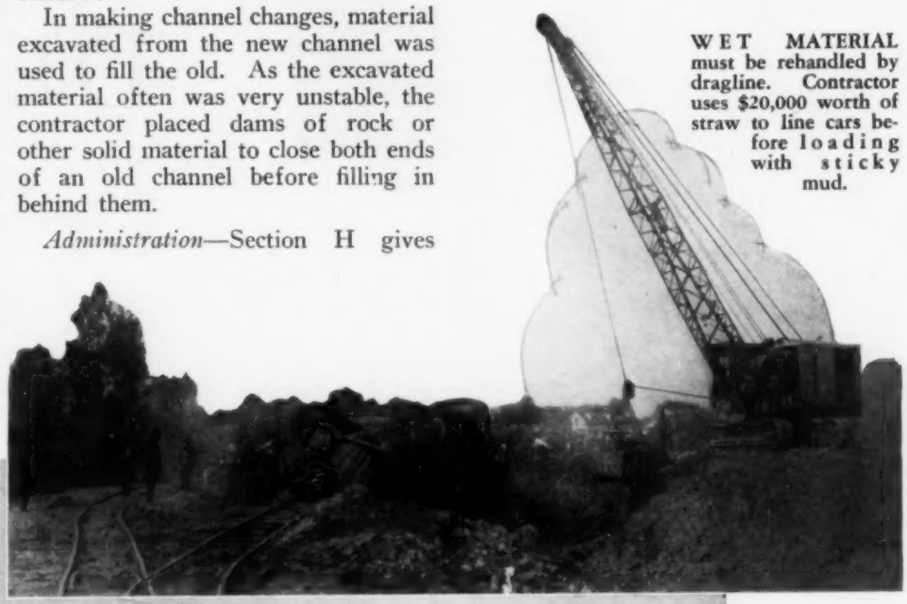
Slides—As might be expected in this kind of work, numerous slides were encountered on some portions of the channel. One section, 700 ft. long, had banks of such unstable material that they required special treatment to preserve them. Before excavating the channel on this section, the contractor cut a trench about 100 ft. behind the proposed bank of the canal. This trench was excavated to the grade of the bottom of the proposed channel. The side of the trench sloping toward the channel was covered with gravel base paved with riprap. This coarse stone covering drained to a pipe at the bottom of the trench. The drainage system removed water which otherwise would have penetrated the channel banks and caused them to slide. Draglines backfilled the drainage trenches with spoil from the main channel.

In making channel changes, material excavated from the new channel was used to fill the old. As the excavated material often was very unstable, the contractor placed dams of rock or other solid material to close both ends of an old channel before filling in behind them.

Administration—Section H gives evidence of the same engineering skill in location and design exhibited by all other portions of the River Des Peres storm-water sewer. Construction is under the control of the Division of Sewers and Paving, W. W. Horner, chief engineer, and H. Shifrin, assistant chief engineer. H. J. Horan is engineer of sewer construction, and G. H. Gruetzemacher, Jr., was resident engineer on Section H.

For R. J. Blackburn, Inc., J. G. Tripp, general superintendent, directed all operations. Under Mr. Tripp were two day superintendents, Lewis Berry and Frank Bruns, and one night superintendent, C. R. Kammerer.

Officers of the contracting organization were R. J. Blackburn, president, Thomas Knobel, vice-president, and Jay Randolph, secretary and treasurer. E. C. Warmbrodt was office manager.

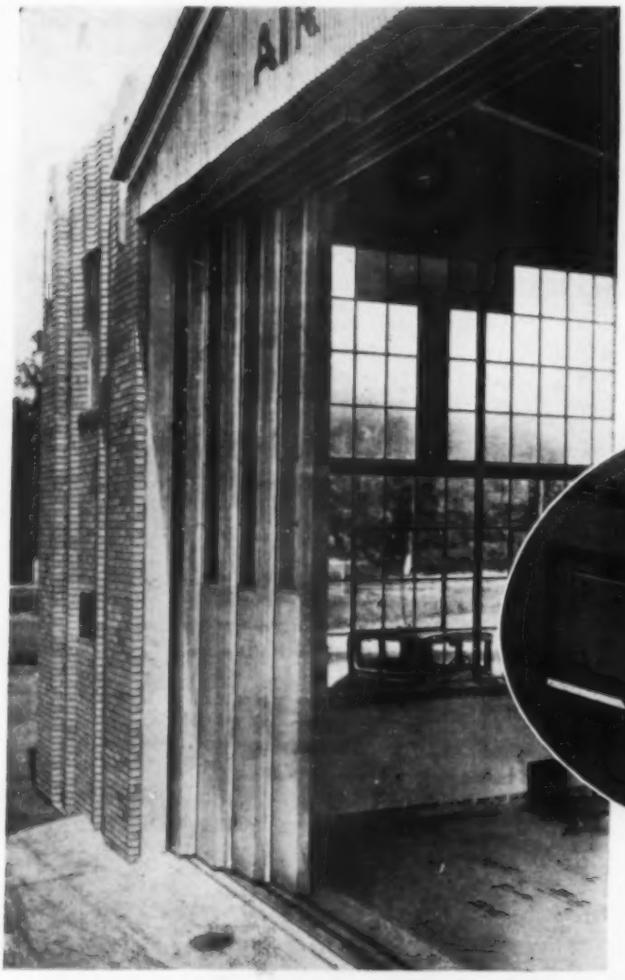


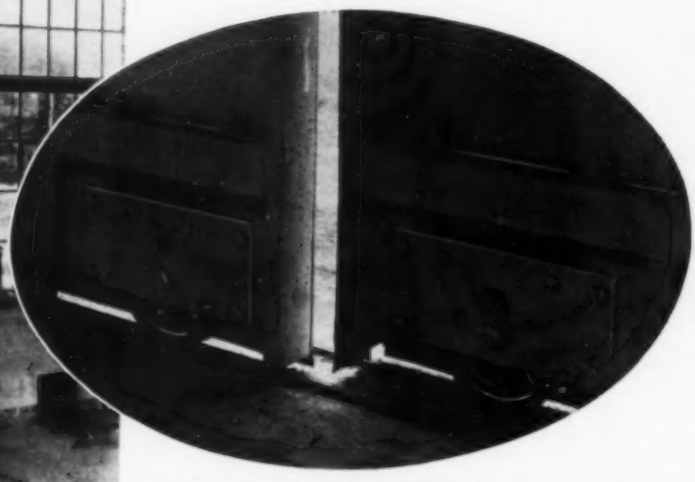
WET MATERIAL must be rehandled by dragline. Contractor uses $20,000 worth of straw to line cars before loading with sticky mud.

JACKING 2-in. pipes into slide in attempt to drain it. 4-YD. WALKING DRAGLINE *(above)* diesel-powered, with 110-ft. boom, is one of the three machines of this type used on earth excavation.

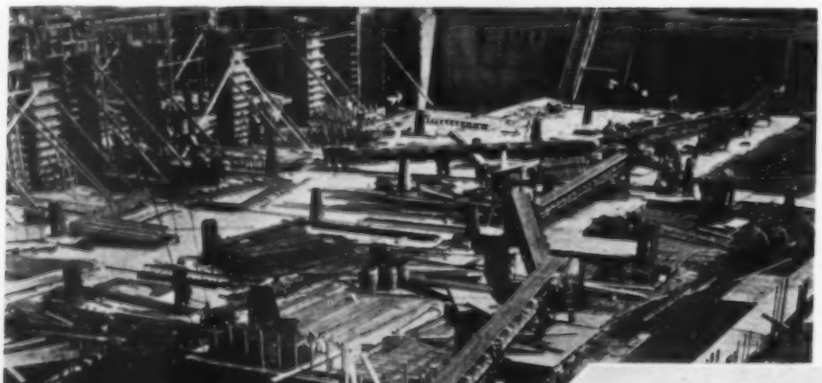
Getting Down to DETAILS

Close-up Shots of
Job Methods and Equipment





MULTIPLE DOORS FOR HANGAR at municipal airport in Wilkes-Barre, Pa., are mounted on wheels running on track. As designed by Macomber Steel Co., the doors slide into recesses at the sides of the hangar, leaving a wide, unobstructed opening for passage of airplanes.

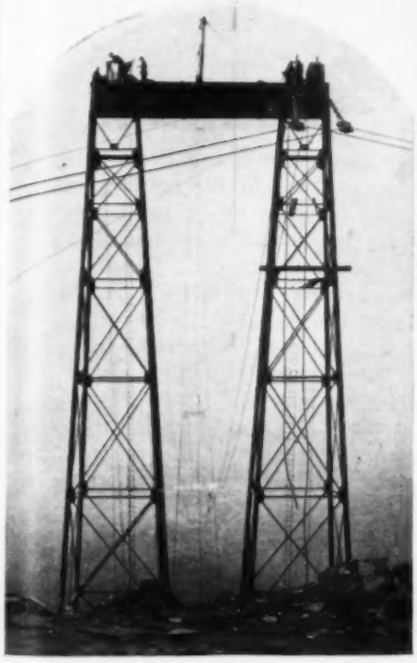


PORTABLE BELT CONVEYORS *(left)* in series, distribute wet concrete for addition to plant of American Can Co. at Inglewood, near Chicago. The Barber-Greene units were shifted from time to time to serve all parts of floor area of new structure.

GUY DERRICKS *(below)* erect bridge. American Bridge Co., for first time on deck bridge, uses four of these units in building 10,000-ton Monongahela crossing for Pittsburgh & West Virginia R.R. at Belle Vernon, Pa.

LONG DRAG, 36 ft. from end to end, and hauled behind motor truck, levels surface of rock asphalt pavement. Roller follows drag to compact surface.

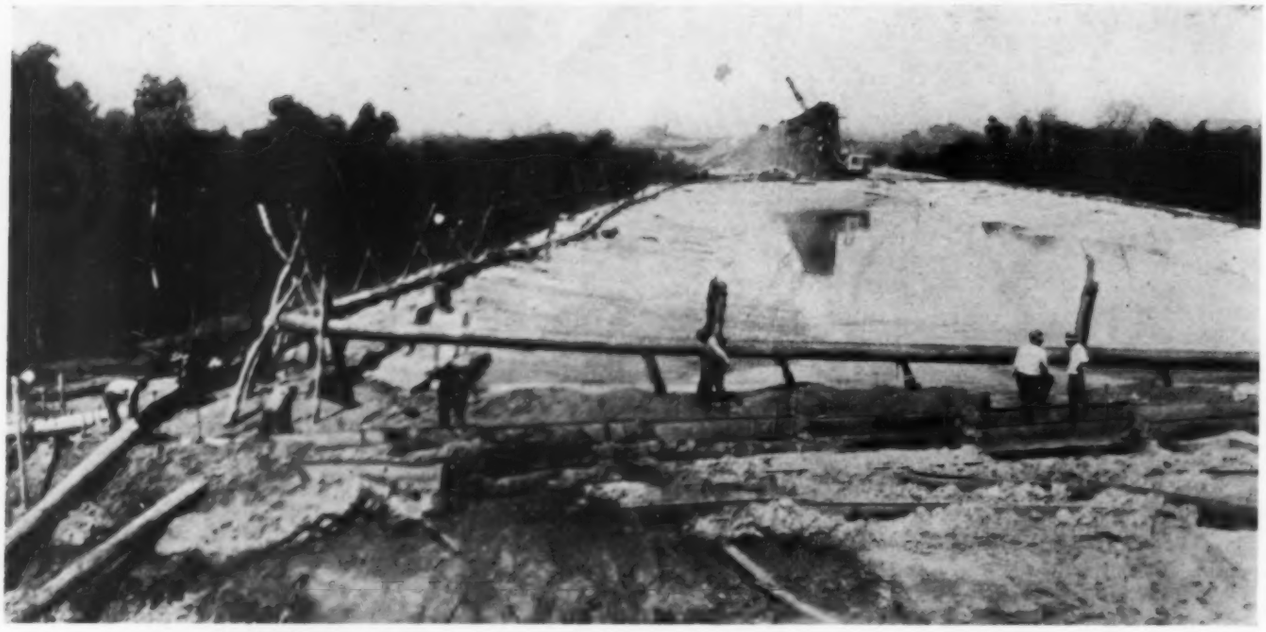
MOBILE STAIRWAY *(above and at left)* on rear of Ford truck enables Western Union Telegraph Co. maintenance and repair crew to reach cables carried on structures of elevated railways in New York. Hand wheels raise and lower working platform or swing it through circular arc.



DUPLEX CABLEWAY is used by Booth & Flinn, Ltd., on construction of Westinghouse memorial bridge, Pittsburgh, having two ribs for each of the reinforced concrete arches in the 1,500 ft. long structure. Span of main central arch is 460 ft.

ADDED WIDTH *(right)* is built into Roosevelt highway at Sheffield, Pa. Sixteen-foot concrete road is increased to 20 ft. by repaving over old surface, and extending sides.—*Photo from B. K. BEEBE, Department of Highways, Pennsylvania.*

SEWAGE OUTFALL PIPE *(right)* 1,800 ft. long, is launched and floated through surf to open sea at Cape Town, South Africa. Chicago Pneumatic Tool Co. portable compressor puts 10 lb. of air pressure on the pipe prior to launching.



HYDRAULIC BASE is built up by discharge lines from 14-in. electric suction dredge.

Trestle-Dumped Fill on Hydraulic Base

Forms Approaches to Railway Bridge

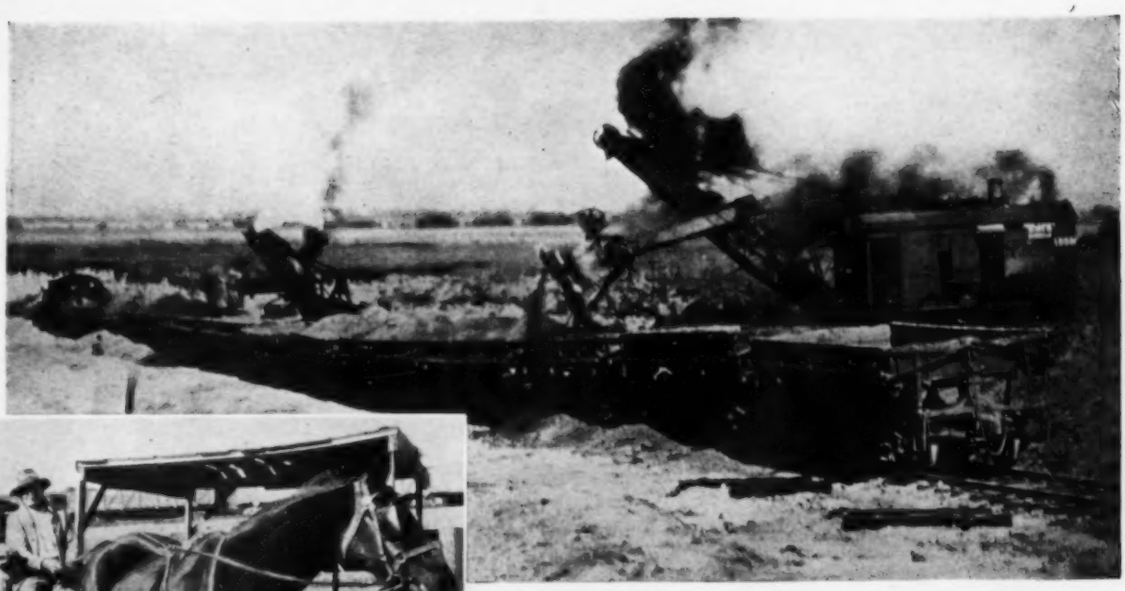
EMBANKMENTS up to 65 ft. high, containing 3,500,000 yd. of hydraulic and dry fill, form the approaches to the new Atchison, Topeka & Santa Fe bridge across the Illinois River at Chillicothe, Ill. The List Construction Co., Kansas City, Mo., general contractor, and four subcontractors rushed construction of these approaches in order to have the line across the new bridge ready for service by July 1.

Because of their height, the embankments were built in two lifts, with from 34 to 45 ft. in the top lift. The approaches have a top width of 42 ft., for two tracks, and side slopes of 1 on 1½. Across the low lands, where the bottom lift is hydraulic fill, the base width averages 230 ft.

Hydraulic Fill—A 14-in. electric

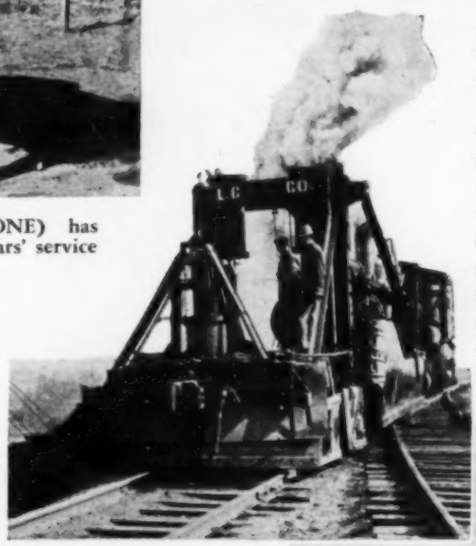
STEEL FLASHBOARDS *(left)* direct flow of hydraulic fill material and aid in maintaining correct side slopes.

AT END OF HYDRAULIC BASE, List Construction Co. builds bottom lift of dry material by dumping from narrow-gage trestle. Piles for standard-gage trestle are driven into dry and hydraulic base. Overflow pipes in side dikes drain excess water from center pool.



TWO 2½-YD. RAILROAD-TYPE SHOVELS load trains in List Construction Co.'s gravel borrow pit.

"BELGIAN DICK" (EMIL TAGHONE) has earned right to save his feet after 32 years' service with List Construction Co.



SPREADERS widen shoulders of fill on both approaches. TRACK SHIFTER *(right)* is used in raising fill on east side of river.

suction dredge of the LaCrosse Dredging Co., Minneapolis, Minn., pumped 444,000 yd. of hydraulic fill to the west side of the river and something less than 400,000 yd. to the east side. The material, taken from the river bottom, consisted of sand and gravel, with many shells. In pumping to the end of the 3,000-ft. hydraulic fill on the west side, the length of discharge pipe amounted to as much as 4,500 ft. Although the dredge pump was driven by a 600-hp. motor which delivered up to 800 hp., the great length of pipe and the increased friction produced by the shells made it necessary to install a 400-hp. steam booster pump in the line.

In order not to delay the progress of the trestle-dump top lift, it was necessary to complete first the hydraulic fill farthest from the river. Dikes 12 ft. high and 3,000 ft. long were built along the toe lines of the proposed embankment, with cross dikes at each end and at two intermediate points, dividing the trough into three sections, each approximately 1,000 ft. long. The dredge built up these sections in turn to a height of about 20 ft.

Hydraulic fill was placed from two pipes, one on each side dike, connecting with the main discharge line. After these pipes had built up the dikes to a height of 20 ft., they were moved into the center to fill the pool.

On the east side, the hydraulic fill extended 2,000 ft. from the river. A 500-ft. section was built up to 25-ft. height; but lack of material prevented the dredge from raising the remaining 1,500 ft. above 12 or 14 ft.

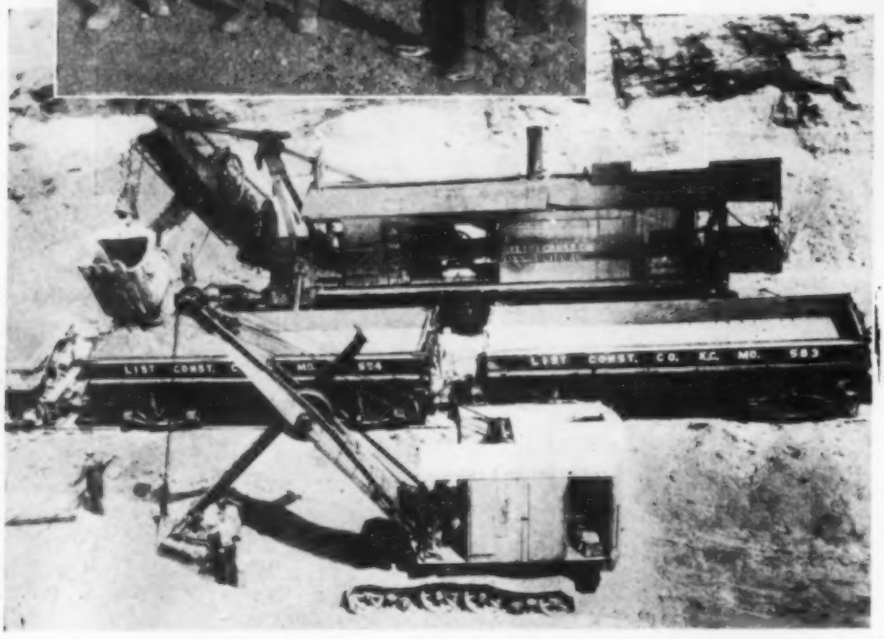
Dry-Fill Base—Other methods were used on the west side to extend the base beyond the 3,000-ft. hydraulic fill. The List & Clark Construction Co., Kansas City, subcontractor, placed 228,000 yd. at the shallow end of the embankment, farthest from the river, with tractor-drawn wagons, bringing the bottom lift to within 34 ft. of finish grade.

Between the tractor-built base and the hydraulic base, the general contractor placed 137,000 yd. of dry fill from a narrow-gage trestle, with six Davenport steam dinkeys and 54 4-yd. dump cars. A Bucyrus 1¾-yd. crawler-mounted steam shovel excavated the material from a borrow pit alongside the fill. Bents of the trestle rested on mud sills.

Top Lift of Embankment—On both sides of the river, the contractors built the upper lift by dumping from standard-gage trestles, constructed of 60- to 70-ft. piles driven into the base. The trestle on the west side was 4,000 ft. long; that on the east was 4,300 ft. in length. A great part of the trestle on the east side was built before the hydraulic fill was placed. As a result, this part of the trestle was about 9 ft. below finish grade.

The embankment on the east side rises on a 0.5 per cent grade from the

W. M. LIST *(at right in group of three men)*, president, List Construction Co.; F. P. KILTY *(center)*, vice-president and superintendent; and JAMES EDGAR, in charge of dump.



3½-YD. RAILROAD-TYPE SHOVEL loads more than 1,000,000 yd. out of borrow pit for C. J. List Construction Co.

existing line to the trestle in a distance of 6,000 ft. Fill for this portion and for the 9 ft. above the trestle was built up by raising track with a Nordberg track shifter.

Borrow Pits—Excellent gravel deposits were available for borrow on both sides of the river about 3 miles from the bridge. The List Construction Co. took 725,000 yd. out of a pit excavated to a maximum depth of 24 ft. Two 2½-yd. Bucyrus railroad-type steam shovels loaded the gravel into four trains of fifteen 12- and 16-yd. Western side-dump cars. During the three months in which the cars dumped from the trestle, before spreading became necessary, the output ranged from 405 to 526 cars a day. Two trains always were left loaded at night, with one empty train ready for each shovel in the morning.

The contractor had on the job a total of six 60-ton six-wheel locomotives and 43 12-yd. and 22 16-yd. cars. A third 2½-yd. railroad-type shovel was available for service in the pit.

East Borrow Pit—A Marion 3½-yd. railroad-type shovel, loaded over

B. H. NEWLEE, assistant engineer, has charge of construction of Illinois River bridge and approaches for Atchison, Topeka & Santa Fe Railway Co.

C. J. LIST *(right)*, in charge of C. J. List Construction Co.'s subcontract on east approach, and J. W. LINCOLN, walking boss.

1,000,000 yd. of sand and gravel out of the east borrow pit. Two smaller excavators, a Lorain 1-yd. gasoline shovel and a Northwest 1½-yd. dragline, were used mainly for sloping banks and opening track cuts.

The C. J. List Construction Co. had four 55-ton standard-gage steam locomotives (two Davenports, a Baldwin and an American) and 50 12- and 16-yd. Western cars to haul from the pit. Usually two 15-car trains were operated. The best month's record, working two shifts, was 160,000 yd.; and the highest output for a month, employing day shift only, was 100,000 yd. Jordan spreaders widened fill on both sides of the river.

Settlement—On the bottom lands, which are low and swampy, considerable subsidence occurred, about 300,000 yd. being lost on the east side and about 200,000 yd. on the west. Where hydraulic base was pumped in, the wet material took up most of the settlement, and less subsidence occurred in the dry fill. As much as 40 ft. of settlement was noted in the fill placed on dry base.

Administration—Construction of the bridge and approaches is under the direction of G. W. Harris, chief engineer, and H. W. Wagner, chief engineer of eastern lines, Atchison, Topeka & Santa Fe Railway. B. H. Newlee is assistant engineer in charge in the field. For the List Construction Co., W. M. List, president, exercises general supervision, and F. P. Kilty acts as superintendent. On the east side of the river, C. J. List directs operations.

JOB ODDITIES

A Monthly Page of Unusual Features of Construction

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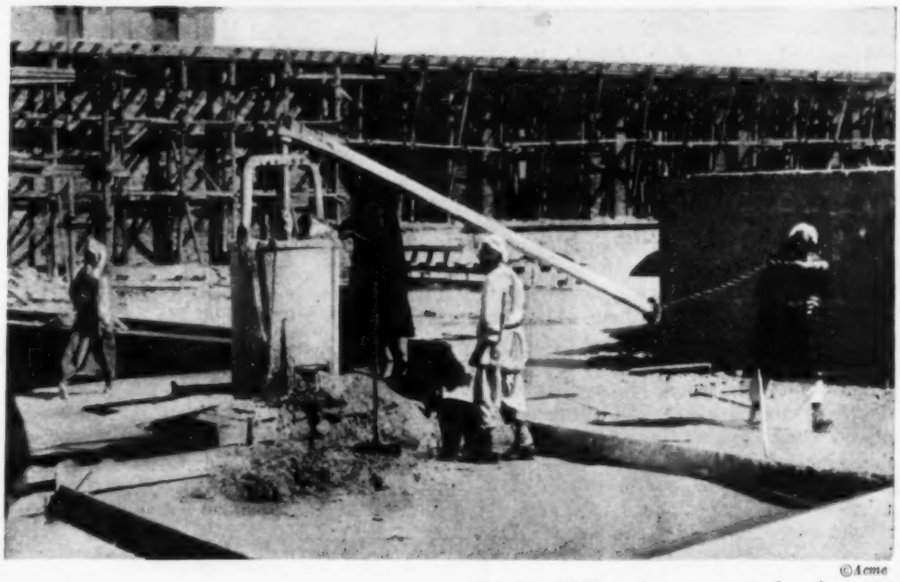
STAIRWAY BRIDGE provides novel crossing over Saale River near Leunawerke, Germany. The structure is a reinforced concrete arch having the general appearance of a picturesque Japanese bridge.

WOOD SPLINTS for weak legs of hoist tower for distributing concrete were improvised by contractor on a dam job. This first-aid measure kept the work going according to schedule.



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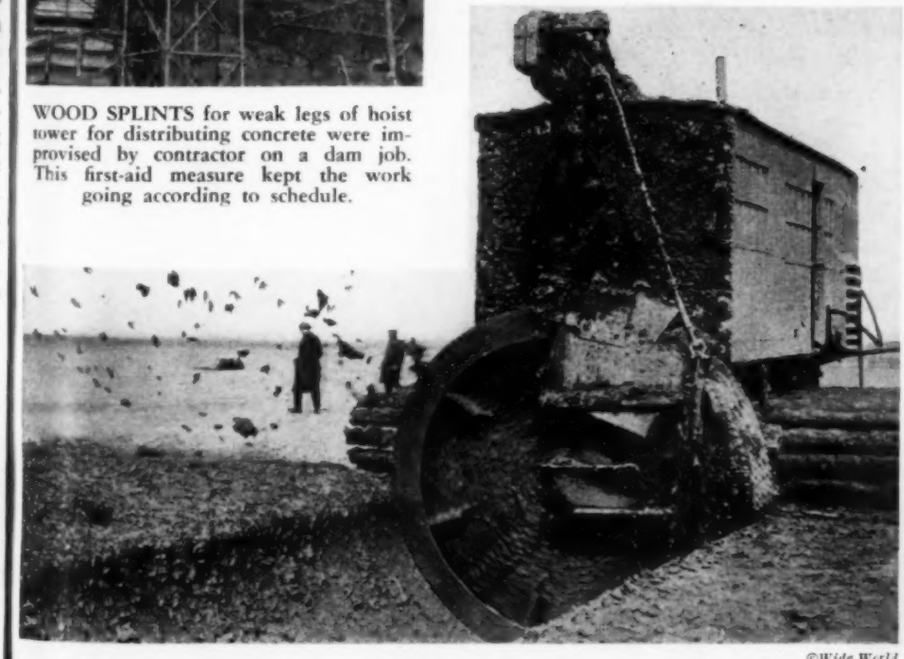
MAN POWER mixes concrete for the new Palace of Justice in Cairo, Egypt. Primitive equipment offers contrast to modern machine methods of construction.



©Wide World

A DUTCH TRENCH EXCAVATOR. Revolving cutter head digs semi-circular trench on construction project in Holland.

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BRIDGE FORMS Y. Japanese structure designed to accommodate traffic from three directions.

SAVE THE SECONDS

— and the Profits on Batch Haulage Will Take Care of Themselves

Part II

ANDREW P. ANDERSON

Highway Engineer, U. S. Bureau of Public Roads, Reports Analysis of Stop Watch Studies to Check Costly Time Losses

HANDLING the cement bags sometimes consumes much more time than should be necessary. Twenty-five seconds per batch of seven bags is readily attained on many jobs, though some few of those studied consumed more than twice this much, usually because of improper loading platforms. For speedy loading, the platform should be somewhat higher than the top of the truck body. A little time will also be gained if the bags in the car are stacked to the same heights as the number of bags required per batch.

On some jobs, especially in the more arid regions, a practice is made of hauling the sacks to the road on separate trucks and distributing them along the subgrade where they are later picked up by two or three men and emptied in the mixer skip. The record shows that when the bags are properly and conveniently placed good laborers can empty them in the skip at the rate of 9 to 10 man-seconds per bag. About the same rate can be attained in dumping the cement bags on the trucks after they arrive at the mixer. Two men are usually employed for this work.

The use of bulk cement is rapidly coming into vogue in some sections. Typical time studies of handling bulk cement in 2-wheel buggies show average values as given in Table 8.

The time which the trucks are necessarily delayed at the cement platform need only be a few seconds more than the time required to dump the buggies on the truck, or about 15 sec. per batch. At least one more buggy than the number of batches handled by each truck should be provided.

A few time studies have also been made on the operation of mechanical plants for handling bulk cement. The average values obtained from these studies are given in Table 9.

Present practice in handling bulk cement usually requires that the cement be dumped on top of the sand and gravel and a canvas cover be spread over the load or else that it be carried in a special container. Spreading and fastening down the canvas covering usually consumes from 20 to 30 sec. additional.

Truck Operation at the Mixer

When the truck reaches the vicinity of the mixer the first operation is usually to turn it either by maneuvering through a space where a couple of forms have been removed, or, more frequently, on a turntable. The value of the turntable lies chiefly in the fact that for some types of truck the time of turning is considerably decreased, and if the ground is soft the subgrade is not cut up so badly. Table 10 shows typical time studies of good operation of a light turntable in turning one-batch trucks.

For heavy trucks a larger table is required, and the time elements are somewhat increased, but even a 3-batch truck can readily be turned in 60 sec.

TABLE 8.—*Time of handling bulk cement; three men loading buggies*

Operation	Time in seconds
Loading buggy	67.0
Wheeling buggy to scales	13.0
Weighing and adjusting contents	16.4
Wheeling buggy to truck	7.2
Dumping buggy on truck	12.4
Returning buggy for loading	13.0
Total time per buggy	129.0

TABLE 9.—*Time of operation of bulk cement batcher*

Operation	Time in seconds
Loading and weighing	26.9
Dumping cement on truck	23.8
Total cycle	50.7

TABLE 10.—*Time analysis of turntable operation*

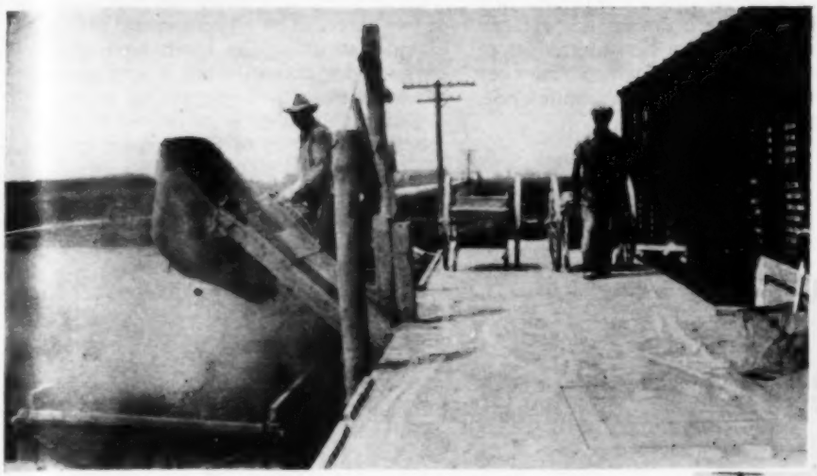
Operation	Time in seconds
Running truck on turntable	4.4
Rotating turntable 180°	12.1
Backing truck off turntable	7.7
Total time to turn truck	24.2
Time required to return turntable for use of next truck	10.6
Total operating cycle	34.8

A common custom, where the cement is carried in bags on the batch-trucks, is to have the dumpers climb aboard as the truck reaches the turntable or the turning place. Two men can readily dump the bags while the truck is turning and backing to the mixer, especially if the tie wires are cut at the loading plant. More frequently a small platform or light truck is kept some distance ahead of the mixer, where each truck stops long enough for the men to step aboard, dump the bags and step off. The time required is about 5 sec. per bag when two men work on the platform, or 10 man-sec. per bag. While this method makes it easier to take care of the empty bags, as they can all be saved, bundled, and tied up by the men who do the dumping, a definite amount is added to the time constant of the truck operation. For 2-batch trucks carrying 14 bags of cement this is seldom less than 75 sec. The saving in bags and the added safety of the workers must then be balanced against this extra cost of truck time. Probably there are many jobs on which adoption of this method would prove profitable.

The actual dumping of properly equipped 1-batch trucks as well as of each batch of the larger trucks, is often accomplished in 10 sec., and in no case should the truck detain the skip for more than 30 sec. An average time of 20 sec. for dropping each individual batch is found on many jobs. The total time which the truck is necessarily detained in unloading, however, varies with the number of batches carried and the operating cycle of the mixer. If the skip is down, the 1-batch truck can drop its batch and immediately proceed on its way for another load. For 2-batch trucks the total dumping time generally approximates 1½ cycles on a well-managed job. The time the truck is actually detained even on perfect mixer and truck operation will closely approximate 2½ and 3½ mixer cycles for the 3- and 4-batch trucks, respectively.

Variations in truck hauling speeds, both loaded and unloaded, are large. The studies made include jobs on which the average round-trip speed rarely exceeded 10 miles an hour and, for individual 1-hour studies was as low as 6 miles an hour, as compared with jobs on which the average round-trip speed exceeded 30 miles an hour and exceeded 40 miles an hour during certain 1-hour studies. The average length of haul from loading yard to mixer on 122 jobs was

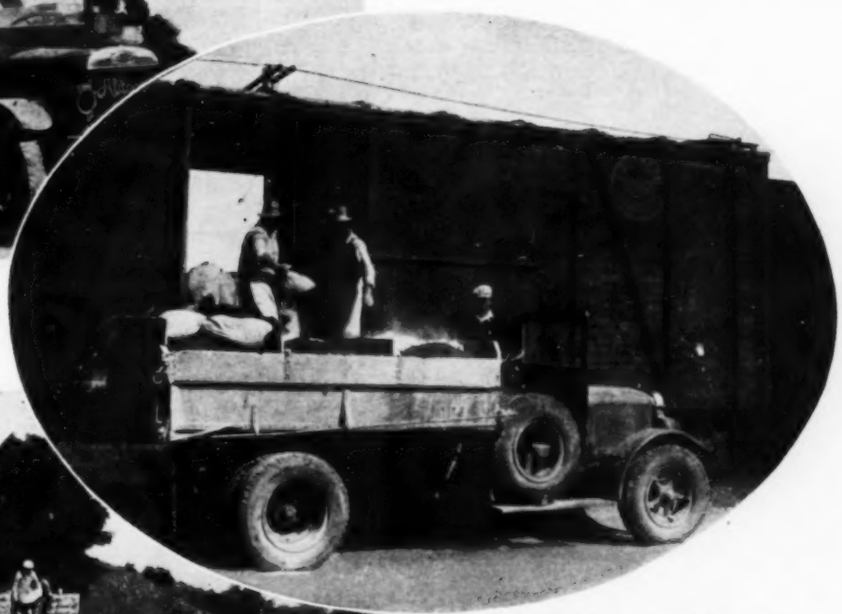
HANDLING CEMENT *on Concrete Paving Construction*



FOR BATCHING BULK CEMENT with wheel buggies this platform device is simple and convenient. Hinged runways with canvas hood carry cement buggy out over waiting motor truck.

WHILE TRUCK IS BACKING to mixer, time is saved by emptying cement bags on each batch.

TWO MEN can readily empty the cement bags on the batches at the mixer if the tie wires have previously been cut at the loading platform.



DIRECT LOADING of cement from car to truck, without an intermediary platform, is likely to prove a false economy.

WHERE RAINS ARE INFREQUENT, cement is often hauled to job by truck and distributed alongside the road in advance of the paving mixer.

found to be 2.65 miles. Complete hauling studies are not available for all of these jobs, but the average round-trip speed on all those containing complete data was 18 miles an hour, with maximum speeds on individual 1-hour studies running as high as 45 miles per hour to as low as 6. A high speed is ordinarily of little productive value unless it can be maintained fairly consistently and includes all the hauling units. Jobs using a variety of trucks of different sizes and speeds show almost without exception a low average speed and a large time constant.

Hauling and Returning Speeds Different

The variation in speed between the loaded and the returning vehicle is sometimes very large. This is especially true on jobs using light 1-batch trucks for hauling a large size batch, thus overloading the trucks sufficiently to reduce materially the speed of the loaded vehicle. Trucks which are not overloaded do not show much variation between loaded and return speeds except when road conditions are poor. Table 11 gives the average hauling speeds on a selection of jobs most of which were operating under better than average conditions. It will be noted that the 1-batch trucks show the widest variations between hauling and returning speeds. This fact is definitely traceable to overloading of these light trucks.

TABLE 11.—*Effect of loading on speed of trucks in concrete paving work; selected jobs, road conditions good to fair*

Job No.	Number of batches per load	Average speed [1] Loaded miles per hour	Average speed [1] Return miles per hour
1	3	17.9	19.5
2	3	18.2	20.0
3	3	23.0	30.8
4	3	23.3	26.1
5	3	24.6	25.7
6	3	25.7	30.7
7	2	17.2	23.8
8	2	17.4	19.8
9	1	11.6	21.9
10	1	16.4	26.9
11	1	17.1	27.5

[1] Averages of not less than 10 days.

A survey of all these data indicates the difficulty of finding and applying any one standard rule or formula as a guide for the proper number of hauling units of any given kind which the contractor should put on his particular job and the manner in which this number should vary from day to day with the length of haul. The investigation indicates that the only really valuable method is the regular use of the stop watch on the job to evaluate the various factors which make up the time constant and to obtain the actual round-trip speed; and then, by entering these values in a formula or a graph, to obtain the number of trucks which will be needed each following day.

After the various time constants have been evaluated the following formula is suggested for finding the number of trucks needed. The chief merit of this equation lies, perhaps, in its form, which is such that its use should naturally stimulate an interest in each of the various factors which control the number of batches a given vehicle can deliver in a given time. The formula is perfectly general and can be applied to any set of hauling conditions in which the key equipment operates on some definite cycle. It is expressed as follows:

$$N = \frac{120L}{Snt} + \frac{T}{nt}$$

N is the minimum number of trucks required to keep the mixer in continuous operation.
L is the length of haul in miles from the material yard to the mixer.
S is the average round-trip road speed, in miles per hour, maintained by the trucks between the above points.
T is the total time constant in minutes; i.e., the time which the truck is actually required to spend regularly in loading, turning, backing, dumping, and waiting during each round trip.
t is the actual mixer cycle in minutes; i.e., the time required to pass each batch through the mixer.
n is the number of batches carried by each truck.

The first term of this expression, $\frac{120L}{Snt}$, represents the number of trucks which under these operating conditions should be on the road at any moment, while the second term, $\frac{T}{nt}$, represents the number of trucks which should be either in the material yard or at the mixer.

Large Trucks on Short Hauls

Calculated results based on the average time constants found on well-managed jobs, indicate that for much of our short-haul paving work the large trucks operate under a rather serious handicap. Thus, on a ¼-mile haul and a round-trip speed of 10 miles an hour, which is quite common on hauls of this length, a 4-batch truck is worth, in delivering batches, only about 57 per cent more per hour than a 1-batch truck and only about 19 per cent more than a 2-batch truck. Even on a ½-mile haul and at an average round-trip speed of 15 miles per hour, the 4-batch truck is worth in delivering batches only about 69 per cent more than the 1-batch truck and only about 22 per cent more than a 2-batch truck, which of itself is worth only about 38 per cent more than the 1-batch truck. When the haul has reached an average of about 1 mile, the round-trip speed should be about 20 miles per hour. In this case the 2-batch truck becomes nearly equal in delivery value to 1.5 one-batch trucks, and the 4-batch truck nearly equal to 2 one-batch trucks, or to 1.3 two-batch trucks. On long hauls the apparent advantage of the 1-batch truck at even equal speeds practically disappears.

It should not be inferred from these results that one particular size of truck is necessarily more economical or more desirable for concrete paving work than any other on a given job. The relative cost of hiring or operating the various sizes of trucks must also be considered.

Disadvantages of Contract Hauling

That degree of coordination which much be maintained between the mixer and the hauling equipment with respect to both supply and operation, in order to produce square yards of pavement in place at the lowest possible unit operating cost, can only be achieved if all the operations involved are under the full control of one party. The rather general practice of subcontracting the batch hauling not only divides authority but it sets up two parties with essentially opposing interests, one of which must be subordinated if the job as a whole is to be operated on the most economical plan. For the contractor to own sufficient trucks to supply the longest occasional haul, however, would probably be unprofitable, unless other uses should be available for the extra trucks after completion of the long haul.

In view of the fact that the average haul for all jobs studied in this analysis was 2.65 miles, it would not seem advisable for the ordinary contractor to keep on hand hauling equipment sufficient to supply the full requirements of the mixer on hauls of more than about 3 miles. Under ordinary operating conditions, an average round-trip speed of 20 miles per hour, and a 1-minute mixing specification, a 3-mile haul would require about 18 one-batch, 11 two-batch, 8 three-batch, or 7 four-batch trucks. On the first part of a 6-mile haul (assuming no increase in average speed) this plan would involve the hiring of 3 four-batch, 5 three-batch, 7 two-batch, or 14 one-batch trucks, each hired truck to be released when no longer required. In order to insure getting these extra trucks when needed and maintaining full authority over the control of the drivers, it would probably be necessary to pay a little above the prevailing rental, but this item should not equal the carrying cost of owning these vehicles during the long periods when they would not be needed on the job.

Conclusions Summarized

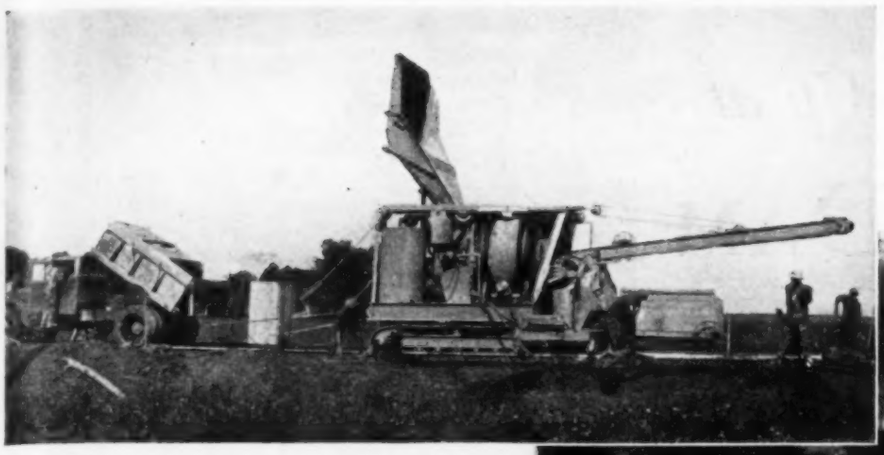
The major point brought out in this investigation is the fact that under present methods and practices of providing, directing and operating the hauling equipment, the paving contractor loses about 17 per cent of his time, which might otherwise be utilized in further production. A part of this loss is due to the rather prevalent use of a method of subcontracting in which the economic interests of the two parties are antagonistic. The use of this system, at least in its present form, is unsatisfactory and should be discontinued.

A larger portion of these time losses, however, is due to faulty or inefficient operation. Numerous instances are found where under able management and proper supervision these time losses have been greatly reduced and a corresponding financial reward obtained.

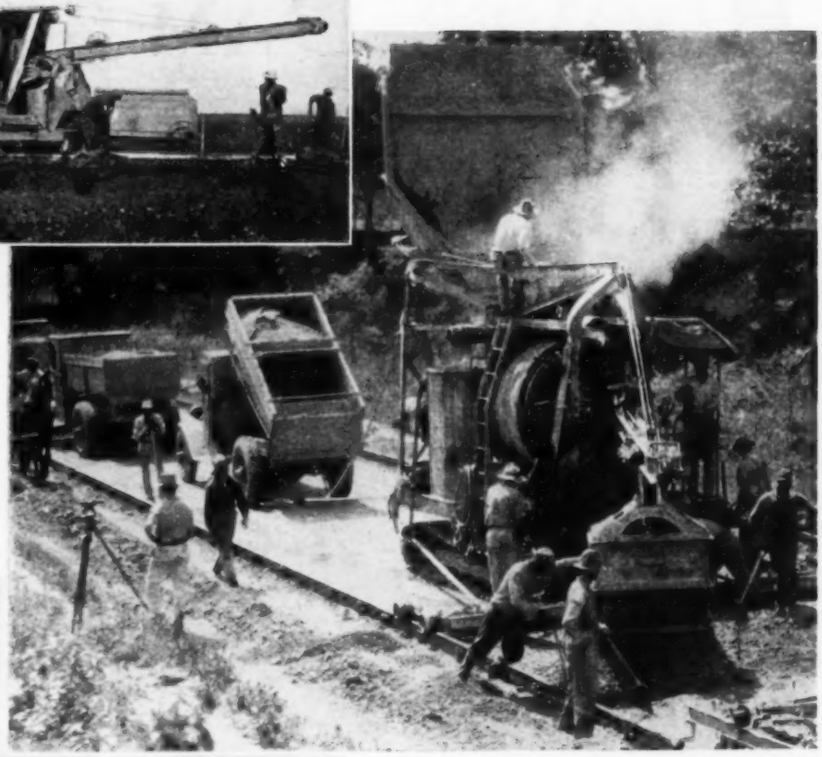
Too frequently much of the seeming inefficiency of the truck operation is really due to a poor yard layout or to faulty operation of the loading equipment. Careful planning of the yard layout before the loading plant is set up should obviate many of these difficulties.

Once the work of pouring concrete has actually begun, nothing will probably prove so effective in reducing time losses and correcting faulty methods of operation as able supervision abundantly supplied with actual facts obtained through frequent use of the stop watch.

Truck Haulage and Dumping at Mixer

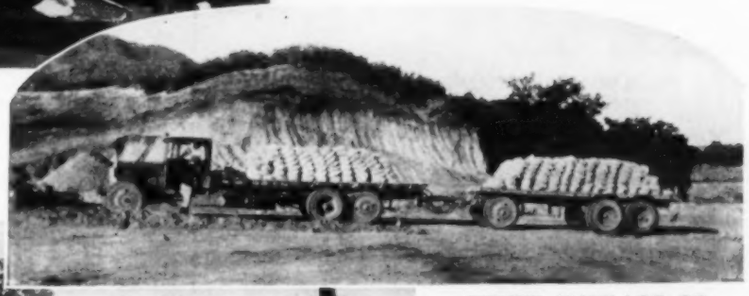


WITH A THREE-BATCH TRUCK the second batch can be dropped as soon as the mixer skip is lowered, but a full mixer cycle must then elapse before the third batch can be discharged.



IF TRUCK BODY is hoisted into dumping position while truck is backing up to the mixer no time is lost in discharging batch when skip is lowered.

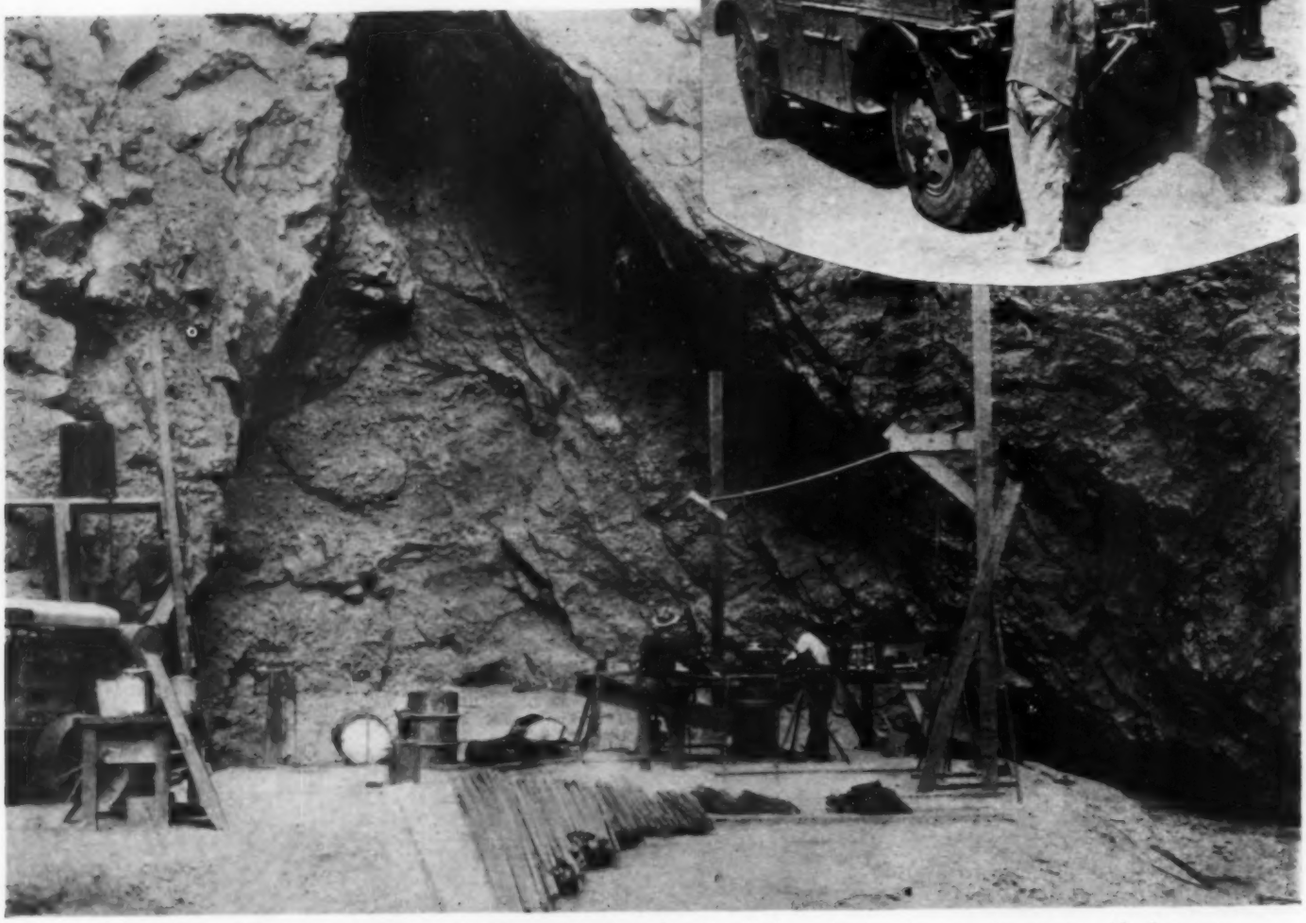
WHEN SKIP IS DOWN, one-batch truck can back into it, drop its load and get away in 10 to 15 seconds.



TRUCK HAULAGE OF CEMENT *(above)* from mill to job occasionally proves cheaper than shipment by rail.

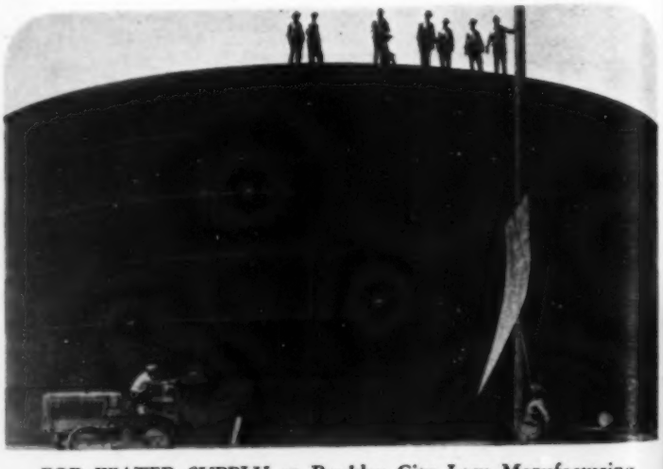
PLENTY OF TRUCKS *(left)*, but they are spotted so far ahead of the mixer that needless time losses will occur in delivering batches.

Progress Speeds Up at
HOOVER DAM



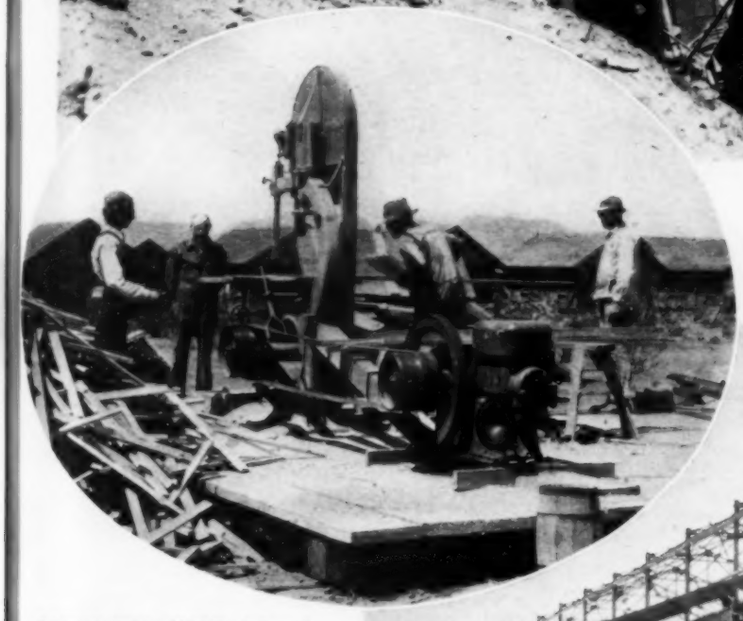
FOR SHARPENING DRILL STEEL Six Companies, Inc., has installed equipment in cave in canyon side between upper end of diversion tunnels and damsite. POST HOLE DIGGER *(insert, above)*, on motor truck, prepares way for installation of telephone and lighting lines to Boulder City.

DIAMOND DRILL high up on rim of canyon on Arizona side of Colorado River obtains rock cores from spillway sites.

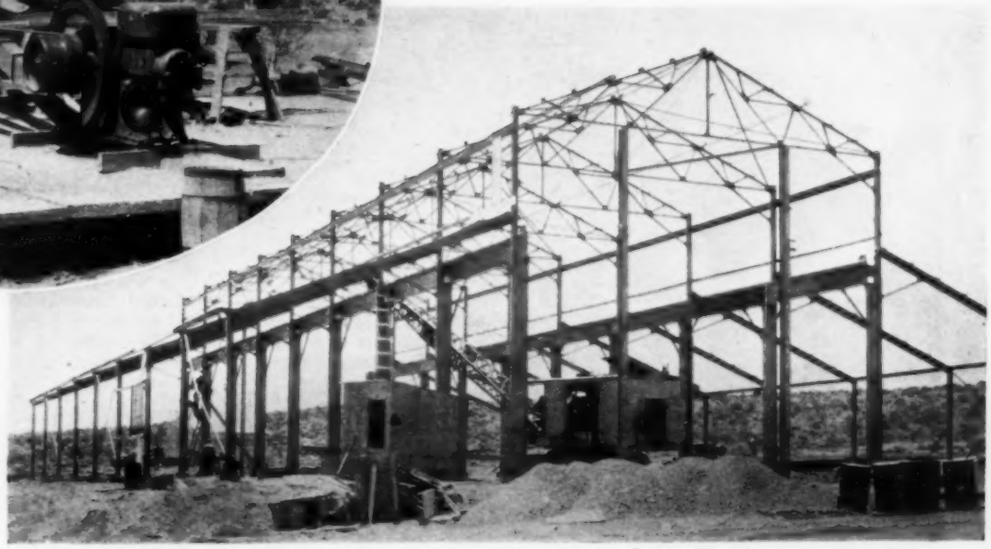


FOR WATER SUPPLY at Boulder City Lacy Manufacturing Co., of Los Angeles, builds 2,000,000-gal. circular steel tank. 100 ft. in diameter.

ALONG CANYON SIDE of Colorado River above dam-site, power shovel cuts route leading to portals of diversion tunnels.



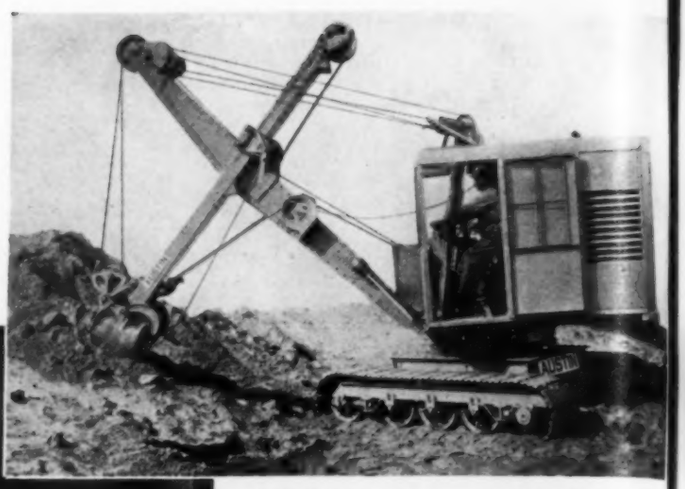
CARPENTER SHOP *(above)* out in the open cuts to size lumber for the erection of the various buildings needed by the contractor.



STEEL FRAME STRUCTURE is erected by Six Companies, Inc., to house machine shop.

WOODEN WAREHOUSE on railroad spur at Boulder City will house construction materials and equipment for "Big Six" organization.

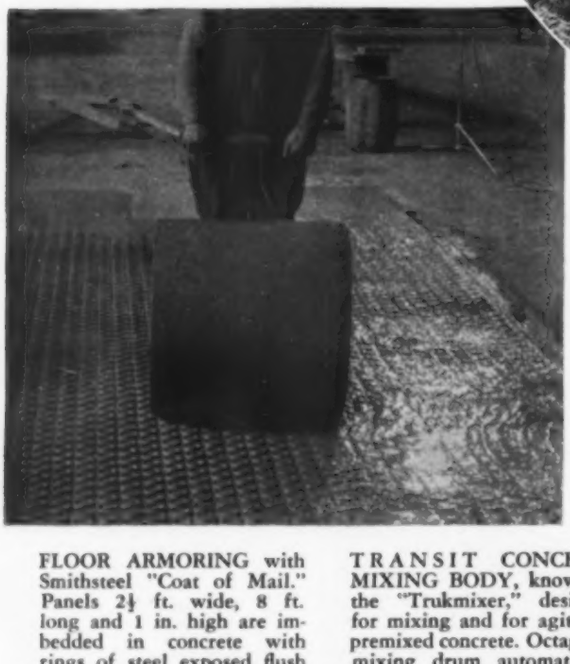
NEW EQUIPMENT *on the Job*



CONVERTIBLE ½-YD. SHOVEL, designed for accessibility of adjustment and repair. Lower frame of high grade cast steel to which are riveted two heavy-duty H-beams supported by crawler treads. Main machinery assembled on upper frame casting. Main drive shaft carries reverse clutches and bevel gears. Standard boom length 16 ft. 6 in. Powered by Waukesha 4-cylinder, heavy-duty motor. Attachments include trench hoe and booms for crane or dragline service—Austin Machinery Corp., Muskegon, Mich.

CONCRETE GUN applies ¼-in. coating to walls and floors. Premix of dry, coarse sand and cement is delivered to feed wheel mechanism at bottom of gun which accurately proportions mix in front of constant compressed air flow. Water is introduced at nozzle.—Pneucrete Corp., Long Beach, Calif.

DRAGLINE BUCKET in use on Presque Isle Peninsula at Misery Bay where State Park & Harbor Commission is building a concrete road. Perfect balance obtained by locating center of gravity with relation to hoist trunnion brackets. Riveted throughout. Drag chain of electrically welded links. Alloy steel renewable, reversible teeth.—Erie Steel Construction Co., Erie, Pa.

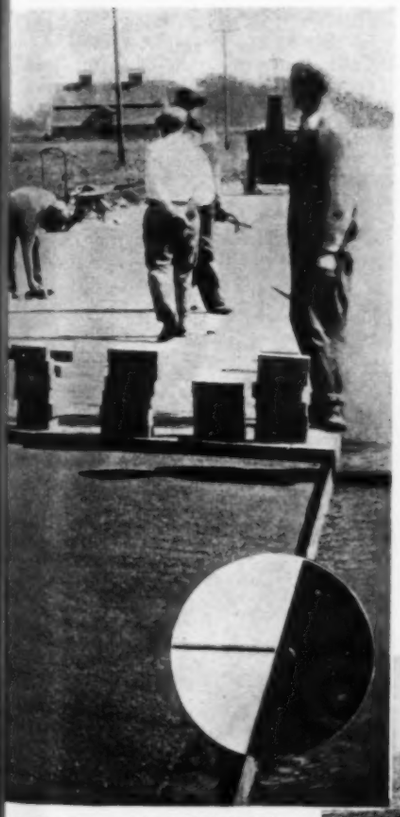


FLOOR ARMORING with Smithsteel "Coat of Mail." Panels 2½ ft. wide, 8 ft. long and 1 in. high are imbedded in concrete with rings of steel exposed flush with floor surface to prevent slipping or skidding. Locking clips join panels.—A. O. Smith Corp., Milwaukee.

TRANSIT CONCRETE MIXING BODY, known as the "Trukmixer," designed for mixing and for agitating premixed concrete. Octagonal mixing drum automatically reverses rotation during mixing. Capacities, 2 to 8 cu.yd. — Blaw-Knox Co., Pittsburgh, Pa.

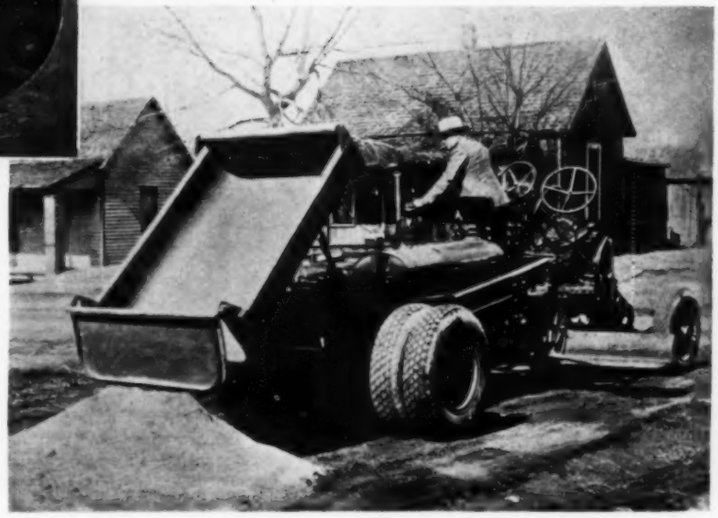
PORTABLE SHEARS for cutting flats and rounds. Unbreakable frame mounted on all-steel wheel truck. Removable pipe handle used either for transportation or cutting. Double socket lever permits convenient operation. Leverage compounded with no parts to get out of order. Stripper on side prevents binding. Cuts flats up to 3x$\frac{1}{8}$ in. and 1-in. rounds, with special knives. — Buffalo Forge Co., Buffalo, N. Y.

WHEELBARROW SCALE *(right)* for measurement of concrete by weight instead of volume. Provided with three beams, top one a tare bar to balance weight of empty wheelbarrow, and two lower ones, each graduated 500x2 lb. for sand and stone. Two sizes, one for wheelbarrows with 42x30-in. platform, weight 275 lb. and the other for carts and buggies with 42x42-in. platform, weight, 320 lb.—Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.



SPRINKLER, SCRAPER AND SNOWPLOW—ALL IN ONE. Two-ton, 150-in. wheelbase Dodge truck equipped with a 500-gal. Columbian tank and a Willett spring road scraper, used at Princeton, Ill., by the county highway bureau. In winter a snowplow is mounted on the front.—Dodge Bros. Corp., Detroit, Mich.

METAL PAVEMENT CURB, designed to give a well-defined edge and prevent raveling at edges. Consists of pair of smooth Armco metal curbs connected by numerous tie-rods gaged for width of finished pavement and fastened near mid-point of curb holding it at rocker point so that equal and opposite pressures bear on old roadway. Supplied in standard 20-ft. lengths.—American Rolling Mill Co., Middletown, Ohio.



DUMP-BODY ATTACHMENT FOR POWER GRADERS *(left)* facilitates maintenance of city and country highways. Operator starts out with load of patching material, fills in holes as he goes along and immediately blades surface, thus completing all operations with one machine. Capacity of dump body 1$\frac{1}{2}$ cu.yd. Furnished on Warco central control power graders. — W. A. Riddell Co., Bucyrus, Ohio.

Present and Accounted For —

A Page of Personalities

Photo—Kaiden-Keystone

HARRIS H. MURDOCK, architect, member of the firm of Jardine, Murdock & Wright, was elected to the presidency of the New York Building Congress at its annual meeting held April 29.

LESLIE R. AMES *(right)* has been appointed by Gov. Gardner to be state highway engineer of North Carolina, a position which he held from 1926 until 1929, when he resigned to become state highway engineer of Louisiana. Prior to his reappointment in North Carolina, Mr. Ames had served as highway engineer for the Consolidated Indemnity & Insurance Co.

HENRY J. KAISER *(left)*, president of the Kaiser Paving Co., Oakland, Calif., has been appointed by the Associated General Contractors of America chairman of a nation-wide committee for the development of needed new construction.

HAROLD ELFORD, junior member of the firm of E. Elford & Son, general contractors of Columbus, Ohio, is the new president of the Associated Building Contractors of Ohio. Among structures built recently under his supervision are the Harding Memorial at Marion, Ohio, and numerous university buildings.

EDWARD H. ELLIS, president of Edward H. Ellis, Inc., Westville, N. J., highway contractor, has been chosen to head the New Jersey Contractors' Association. He has been active in road and bridge building in New Jersey and Pennsylvania.

HON. ERIC RYBERG, partner in the firm of Ryberg Bros., railroad and public works contractors of Salt Lake City, Utah, was chosen a member of the State Senate of Utah at the last election. He is also a member of the firm of Christensen-Gardner, Inc., road building contractors, and president and general manager of the Utah Sand & Gravel Products Corp., and of the Stauffer Sand & Gravel Co. of Salt Lake. Senator Ryberg served in 1924 as president of the Inter-Mountain General Contractors' Association.

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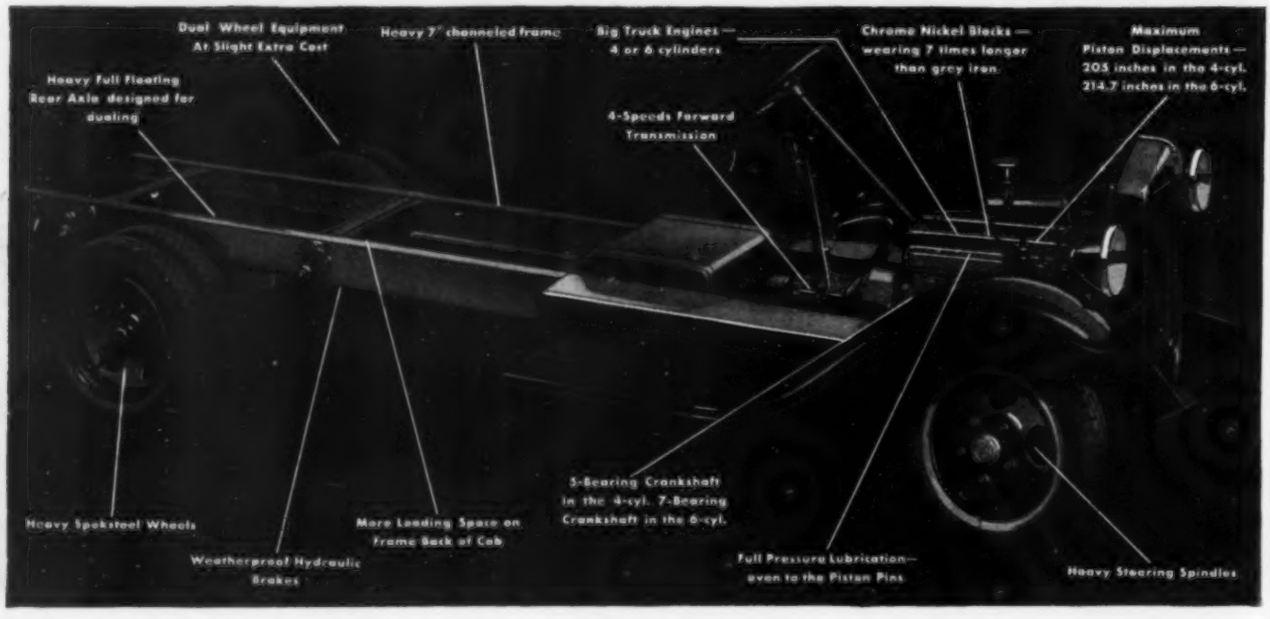
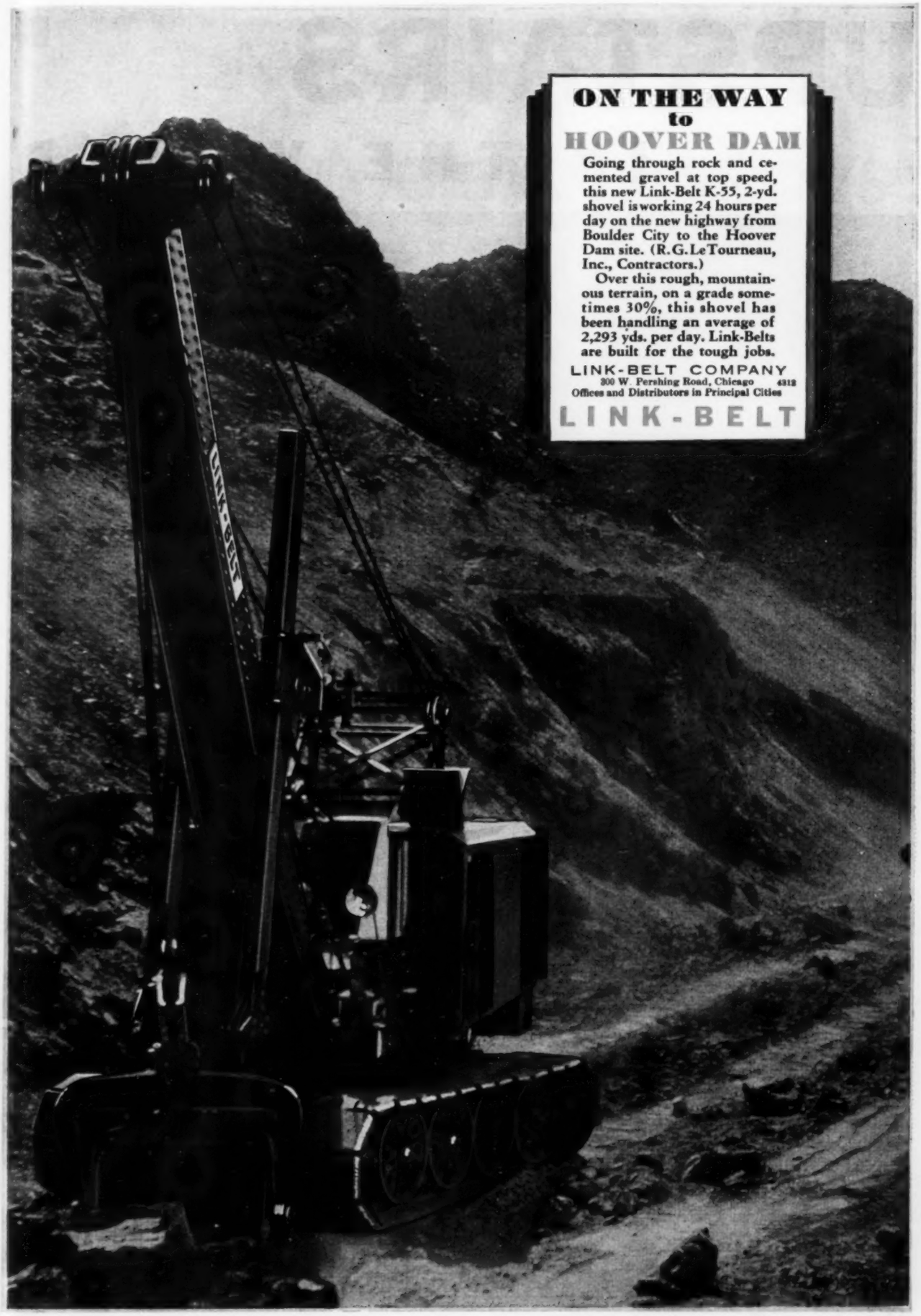
Four-Cylinder $625, Six-Cylinder $725
Chassis f. o. b. Lansing Michigan
DUAL WHEELS EXTRA

REO MOTOR CAR COMPANY, LANSING · TORONTO




ON THE WAY
to
HOOVER DAM
Going through rock and cemented gravel at top speed, this new Link-Belt K-55, 2-yd. shovel is working 24 hours per day on the new highway from Boulder City to the Hoover Dam site. (R. G. LeTourneau, Inc., Contractors.)
Over this rough, mountainous terrain, on a grade sometimes 30%, this shovel has been handling an average of 2,293 yds. per day. Link-Belts are built for the tough jobs.
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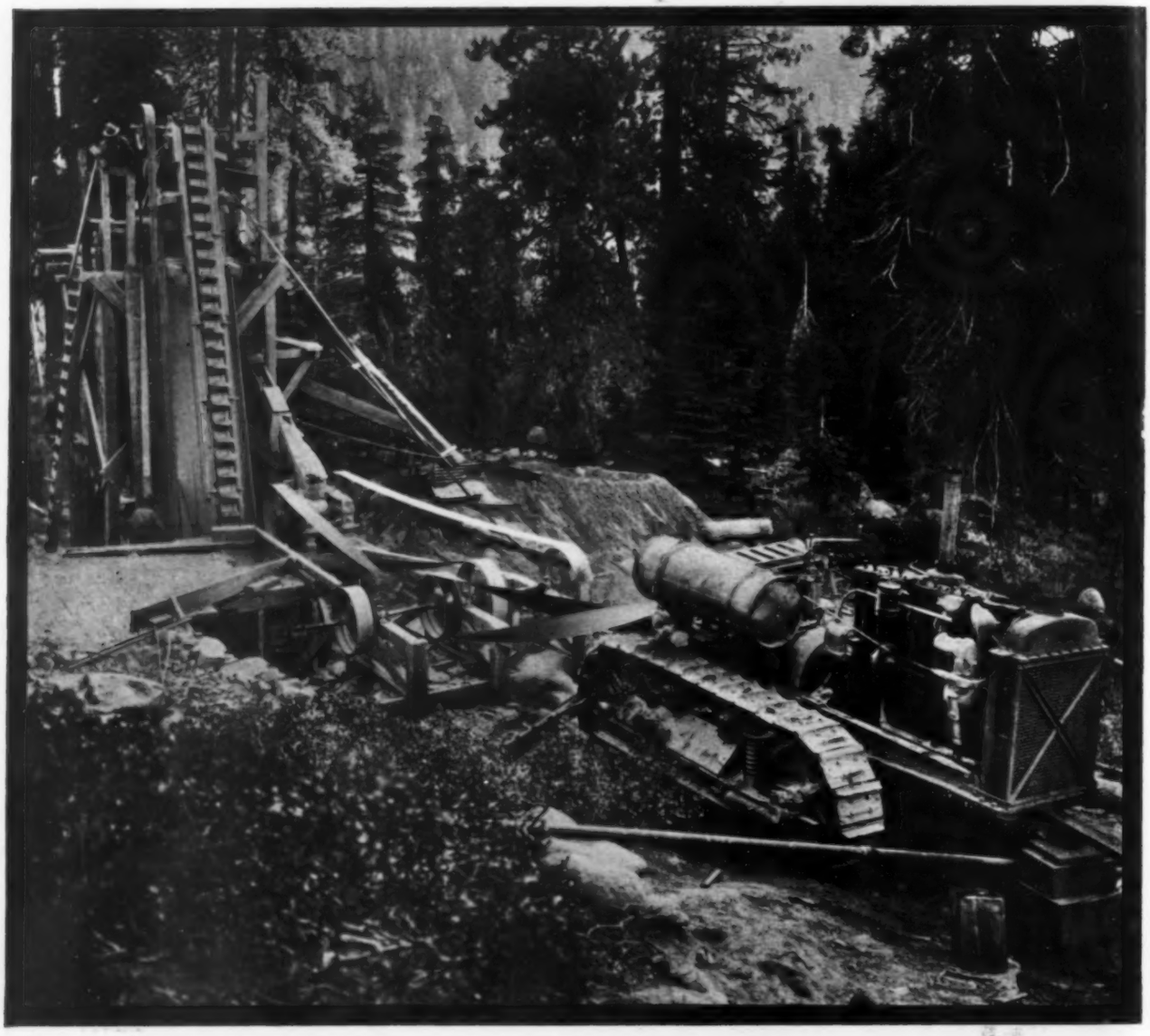
UPSTAIRS IN THE WORLD



THIS "Caterpillar" Sixty runs the rock crusher for Bechtel Bros.—far up in the high Sierras where it costs $60,000 a mile to carve out a road. The "Caterpillar" moves heavy machinery into place, pulls stumps, strips overburden—then runs the plant. Other "Caterpillars" build the road. Grades and altitude, bad weather and poor going, hard rock and soft sand—"Caterpillars" conquer all.

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MANY contractors are. Especially those who use air continuously on such jobs as sewer and tunnel work.

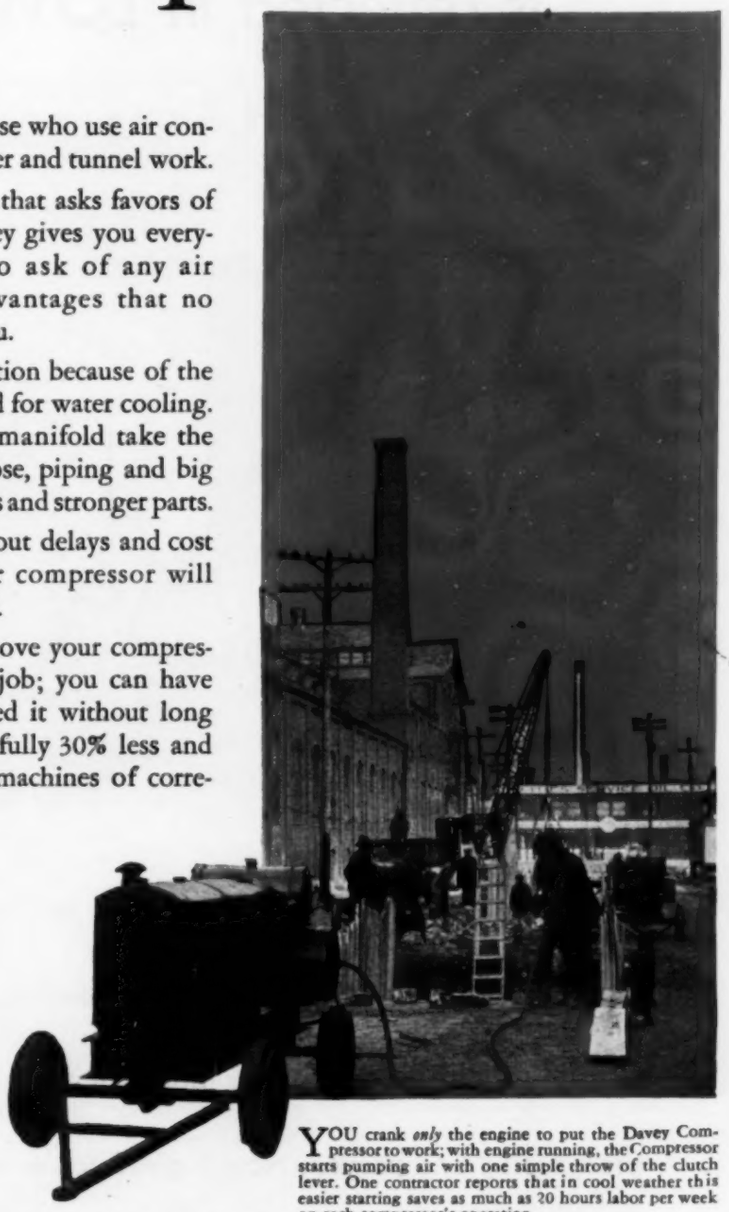
Here's one air compressor that asks favors of nobody. The air-cooled Davey gives you everything you ever thought to ask of any air compressor plus many advantages that no water-cooled job can give you.

"Air-cooling" assures more dependable operation because of the absence of complicated and bulky parts needed for water cooling. Finned aluminum alloy cylinder heads and manifold take the place of cast iron cylinder jackets, radiator hose, piping and big radiators. Simple, rugged design, with fewer parts and stronger parts.

"Air-cooling" retards carbon formation; cuts out delays and cost of carbon removal, makes certain that your compressor will always deliver full pressure and volume of air.

"Air-cooling" makes it possible for you to move your compressor around faster and get it closer to every job; you can have any amount of air where and when you need it without long hose lines. Each Davey trailer unit weighs fully 30% less and occupies 35% less space than water-cooled machines of corresponding size. You can mount the 110 cu. ft. Davey compressor and engine on an ordinary short-wheelbase Ford truck chassis; the 320 cu. ft. Davey is a safe load for any 2 ton truck.

With all its many advantages the Air-Cooled Davey Compressor costs less to buy. Every day you operate a Davey Compressor you save more money. Be sure you see the Davey and figure up all its savings for yourself before you make your next deal. Ask us where you can see one. Use the coupon.



YOU crank *only* the engine to put the Davey Compressor to work; with engine running, the Compressor starts pumping air with one simple throw of the clutch lever. One contractor reports that in cool weather this easier starting saves as much as 20 hours labor per week on each compressor's operation.

The method of cooling air compressors through the use of metals of high heat conducting quality and capacity, as contained in Davey Compressors, is fully protected by patent

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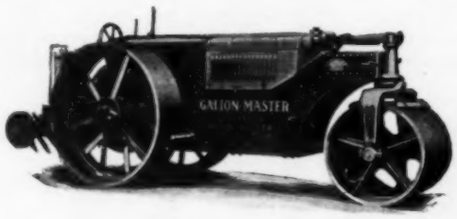
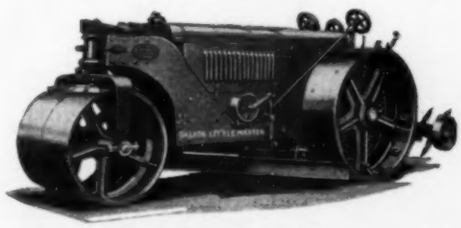
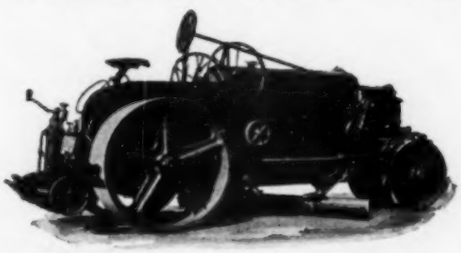


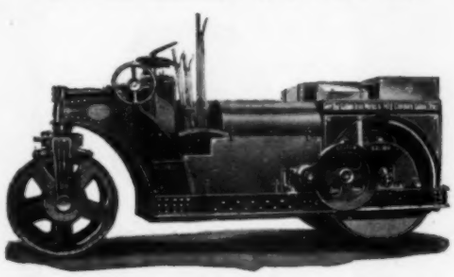
The Galion Master 4-Cylinder Motor Roller
10 or 12 Ton



The Galion Little Master, 4-Cylinder—6, 7 or 8 Ton



The Galion International—5, 6, 7 or 8 Ton



The Galion Tandem Motor Roller—5 to 10 Ton

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COLORADO, Denver—H. W. Moore Equipment Co.
CONNECTICUT, New Haven—
Power Equipment & Service Co.
GEORGIA, Atlanta—R. S. Armstrong & Bros.
ILLINOIS, Rockford—Standard Road Equipment Co.
Peoria—The A. E. Hudson Co.
Springfield—Miller & Requarth.
IOWA, Des Moines—Dukehart Machinery Co.
KANSAS, LaCrosse—F. E. Vaughn.
Salina—Salina Tractor & Thresher Co.
KENTUCKY, Frankfort—Frankfort Equipment Co.
LOUISIANA, New Orleans—
Louisiana Road Machinery Co.
MAINE, Portland—Eastern Tractor Co.
MASSACHUSETTS, Cambridge—Eastern Tractor Co.
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NEW YORK, New York—
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Asheville Supply & Foundry Co.
Raleigh—North Carolina Equipment Co.
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OKLAHOMA, Enid—Bert Smith.
Oklahoma City—Herd Equipment Co.
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TENNESSEE, Memphis—
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WEST VIRGINIA, Huntington—
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WISCONSIN, Milwaukee—
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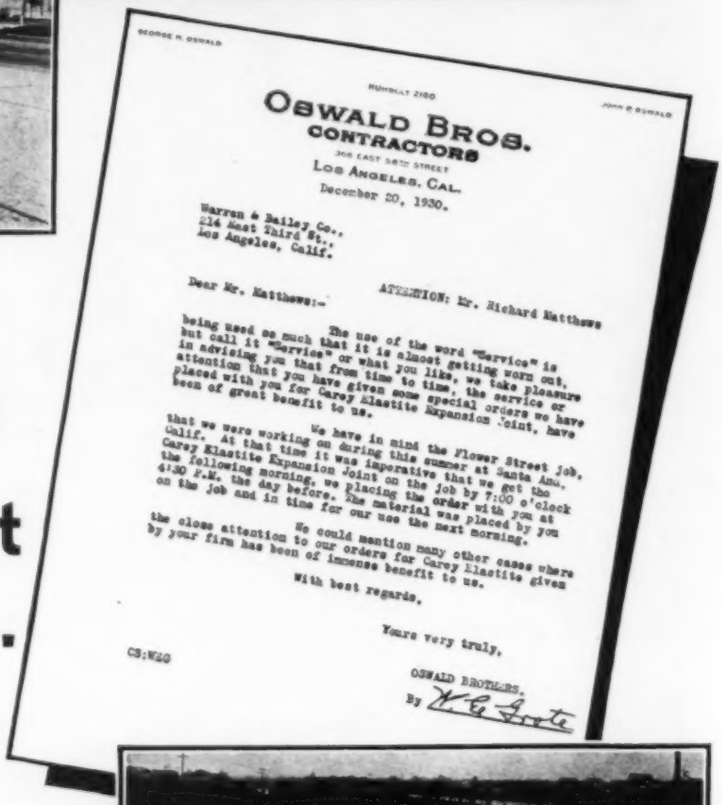
The Galion Iron Works & Mfg. Co.
GALION, OHIO . . . . . .

Photographs show Californi boulevards paved by Oswald Brothers, Los Angeles, California, using Carey Elastite Expansion Joint.

Carey Elastite EXPANSION JOINT

Quick Shipment Cuts Costs . . .



GEORGE H. OSWALD — JOHN D. OSWALD

OSWALD BROS.
CONTRACTORS
306 EAST 58TH STREET
LOS ANGELES, CAL.

December 20, 1930.

Warren & Bailey Co.,
214 West Third St.,
Los Angeles, Calif.

ATTENTION: Mr. Richard Matthews

Dear Mr. Matthews:-

The use of the word "Service" is being used so much that it is almost getting worn out, but call it "Service" or what you like, we take pleasure in advising you that from time to time, the service or attention that you have given some special orders we have placed with you for Carey Elastite Expansion Joint, have been of great benefit to us.

We have in mind the Flower Street job, that we were working on during this summer at Santa Ana, Calif. At that time it was imperative that we get the Carey Elastite Expansion Joint on the job by 7:00 o'clock the following morning, we placing the order with you at 4:30 P.M. the day before. The material was placed by you on the job and in time for our use the next morning.

We could mention many other cases where the close attention to our orders for Carey Elastite given by your firm has been of immense benefit to us.

With best regards,

Yours very truly,

CS:WEO

OSWALD BROTHERS,
By

The service that Oswald Bros. wrote about is made possible by a nation-wide organization of Carey distributors. Ample stocks of Carey Elastite Joint are carried in all large cities, and orders for special as well as standard sizes can be filled promptly.

For almost 20 years "Carey Elastite" has justified the confidence which road builders have placed in it. The correctness of its design—an asphalt compound between strong felt walls—has been definitely proven. Used in concrete roads thruout the entire country, Carey Elastite Joint is depended upon when both quality and delivery must be beyond question.

THE PHILIP CAREY COMPANY × Lockland, Cincinnati, Ohio

Branches in Principal Cities

BUILT-UP ROOFS
ASPHALT PRODUCTS
ELASTITE EXPANSION JOINT
WATERPROOFINGS
ROOF PAINTS

Carey PRODUCTS

HEAT INSULATIONS
ASBESTOS MATERIALS
CAREYSTONE CORRUGATED SIDING
ASFALTSLATE SHINGLES
BUILDING PAPERS

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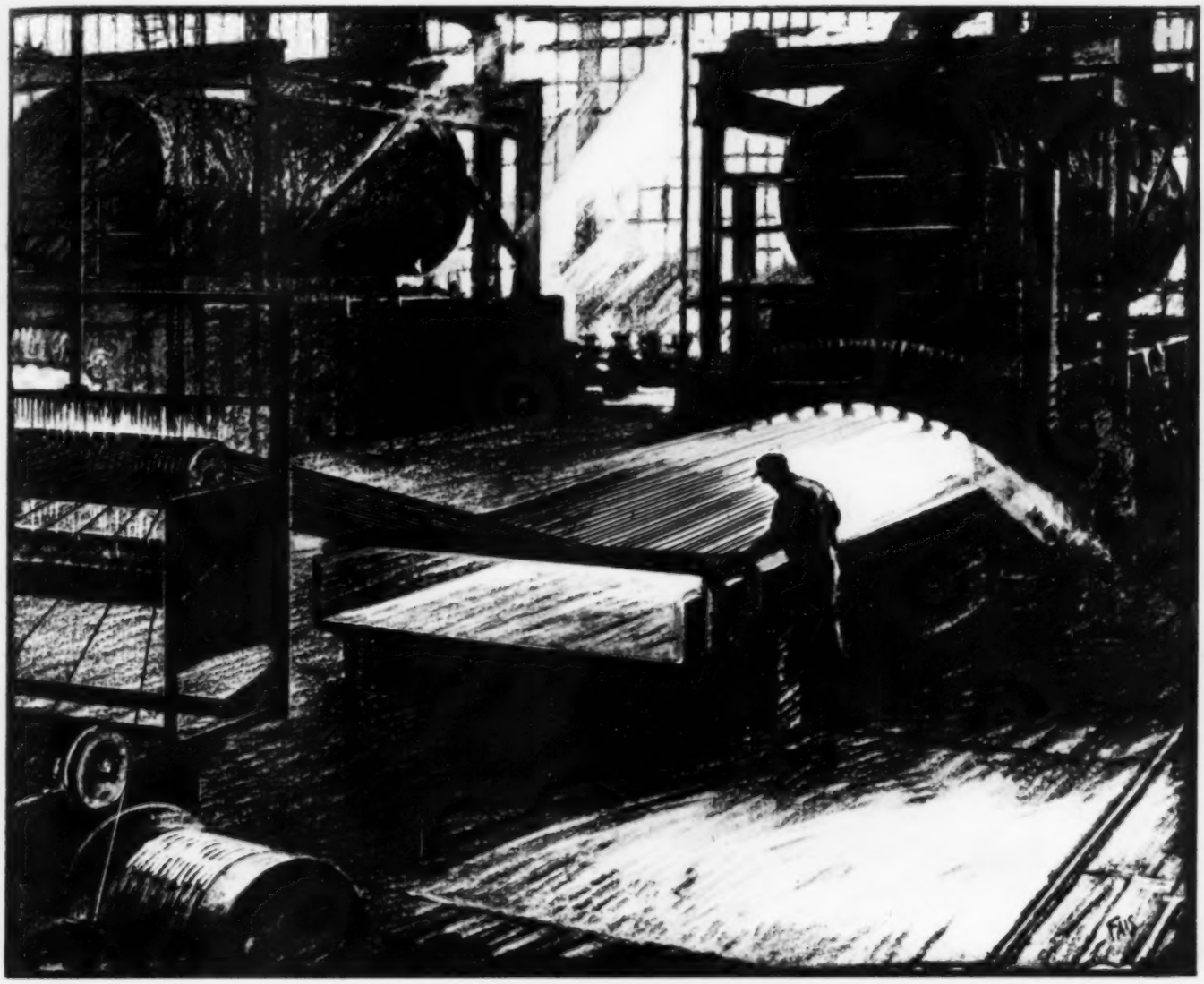


No. 9 of a series of advertisements on "How Superlative Quality is Built into Roebling Wire Rope".

Painstaking Care is the Watchword

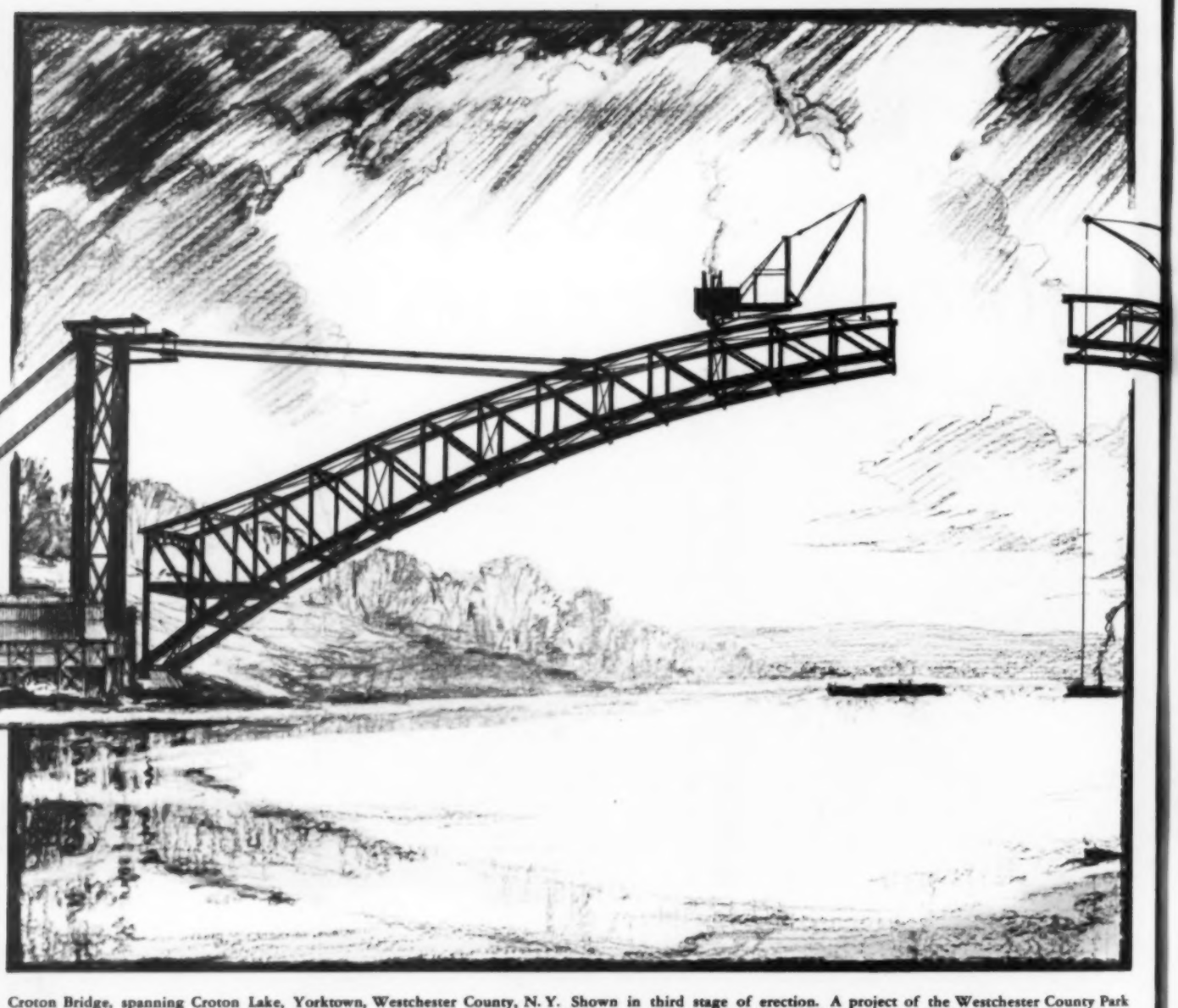
WHEN it comes to making wire of exceptionally great strength and stamina, such as required for Roebling "Blue Center" Steel Wire Rope, ordinary production methods won't do. Skill of the highest order is called for. Painstaking care must be the watchword.

So, in this Roebling patenting shop, the most exacting of standards prevail. Years of experience govern every move and haste is outlawed. Furnace temperatures, the rate at which the wire travels through the furnaces—all elements of the patenting process—have been established through decades of research and development.

Patenting, at Roebling, is a highly developed art —one that contributes much to the great strength and stamina for which Roebling "Blue Center" Steel Wire Rope is noted. Incidentally, the Roebling patenting shop is one of the largest and most modern of its kind in the country.

ROEBLING  **WIRE ROPE**

"BLUE CENTER" STEEL



Croton Bridge, spanning Croton Lake, Yorktown, Westchester County, N. Y. Shown in third stage of erection. A project of the Westchester County Park Commission. General Contractors: P. T. Cox Contracting Company, New York City. Sub-contractors on steel work: The Mt. Vernon Bridge Co., Mt. Vernon, Ohio.

All Depends On The Rope

ERECTING a bridge such as this calls for engineering ingenuity—and wire rope of unquestioned stamina. It is the $846,000 Croton Lake Bridge, a great 750 foot steel arch.

In order to avoid disturbing New York City's water supply in Croton Lake, this bridge was erected by the cantilever method. No supporting false work was used. During the course of construction the heavy steel arch work was supported by Roebling Wire Rope—this rope having been anchored in concrete at each side of the lake by the ingenious Roebling Bridge Strand Anchorage method, passed over the temporary steel towers, and attached to the trusses as illustrated. Rope of absolute dependability obviously was essential.

Altogether, 98 pieces of 2⅜" diameter Roebling Wire Rope were used, totalling 12,500 feet. It was pre-stressed and measured to exact lengths under working tension.

JOHN A. ROEBLING'S SONS CO., TRENTON, N.J.

WIRE . . . WIRE ROPE . . . WELDING WIRE . . . FLAT WIRE
COPPER *and* INSULATED WIRES AND CABLES
WIRE CLOTH *and* WIRE NETTING
Branches in Principal Cities Export Dept.—New York

ROEBLING WIRE ROPE

MILLION-DOLLAR CONCERNS HAVE TESTED THESE TRUCKS FOR YOU

Million-dollar concerns in the Contracting Industry and in all leading industries . . . the country over . . . have proved the merit of Dodge Trucks for you. Million-dollar concerns with hauling work similar to your own, and with a desire—identical with your own—for low cost, dependability and able performance. Million-dollar concerns who continue year after year to increase their already large fleets of dependable Dodge Trucks. » » Your Dodge Brothers dealer will gladly show you the impressive list of nationally-known concerns who have put their faith and their dollars in Dodge Trucks. He will also gladly place a Dodge Truck at your disposal for inspection, test and comparison. You will find its price exceptionally low. You will find that balanced design and precision manufacture insure typical Dodge dependability, long life and economy.

THE COMPLETE LINE OF DODGE TRUCKS RANGES IN PAYLOAD CAPACITIES FROM 1,200 TO 11,175 POUNDS—PRICED, CHASSIS F. O. B. DETROIT, FROM $435 TO $2695, INCLUDING THE 1½-TON CHASSIS AT . . . $595

TO HELP LOWER YOUR HAULING COSTS OPERATING RECORD BOOK FREE

DODGE BROTHERS CORPORATION B-8
Detroit, Michigan
Send your Operating Record Book. I understand there is no obligation.

NAME_____

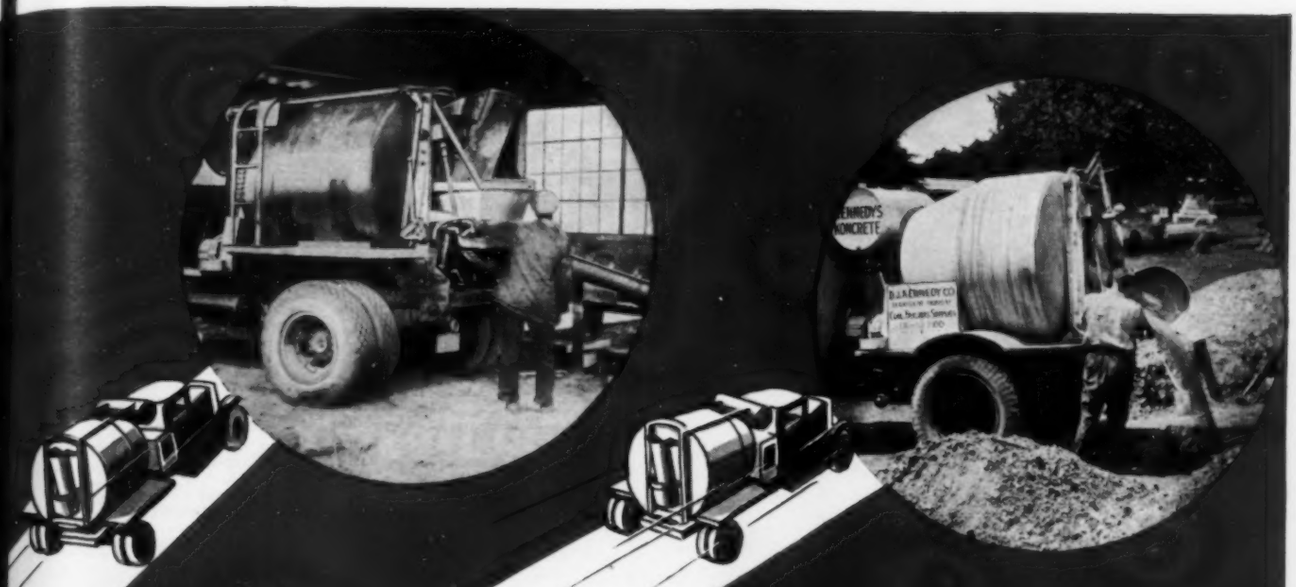
ADDRESS_____

CITY_____ STATE_____

Number of Trucks Operated *(Book for each will be sent)*_____

DEPENDABLE DODGE TRUCKS


WAHLFELD
MFG.CO.
REX
MoToMIXER
TRUCK MIXERS AND



Riding More and More Roads to Profit

Each succeeding month of the past few years has seen Rex Moto-Mixers or Rex Moto-Agitators move into new cities and towns.

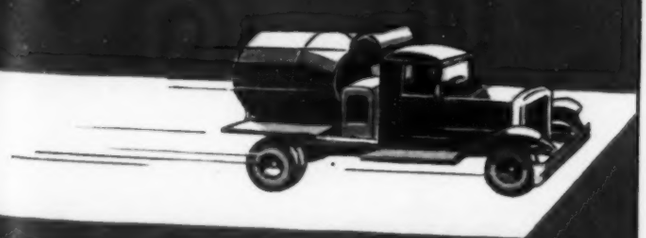
Among the more recent to swing to Moto-Mixers and Moto-Agitators or to add to existing fleets are:

Mamaroneck, N. Y.—Wilkinsburg, Pa.—Peoria, Ill.—Tulsa—Cincinnati—Port Chester, N. Y.—White Plains, N. Y.—Pittsburgh, Pa.—Columbus, O.—Milwaukee, Wis.—San Francisco—Oakland, Cal.—Detroit—Jamestown, N. Y.—Hartford, Conn.—Bridgeport, Conn.—Springfield, Mass.—Hackensack, N. J.—Oklahoma City—New York—Washington—Quebec—Winnipeg—Philadelphia—Montreal—Berkeley, Cal.

The reasons are obvious. Examine a Moto-Mixer. You will see them. Lighter weight. Greater pay-loads. Surer, better mixing action. Lower center of gravity. Faster charging. Wider discharge range. Positive water control. And unusual, anti-friction, wear-defying, modern design and construction.

CHAIN BELT COMPANY

1664 West Bruce Street — *Cable Address:* Beltchain — Milwaukee, Wisconsin



CHAIN BELT COMPANY
1664 West Bruce Street, Milwaukee, Wis.
Cable Address: **Beltchain**

This coupon brings complete information on Rex Moto-Mixers, Moto-Agitators and other Central Plant Equipment.

REX MOTO-MIXERS
2, 3½ and 4 cu. yd.

REX MOTO-AGITATORS
3, 4½ and 6 cu. yd.

REX 28-S, 56-S and 84-S Central Plant Mixers

REX AGGREGATE AND CEMENT ELEVATORS

REX-STEARNS BELT CONVEYORS

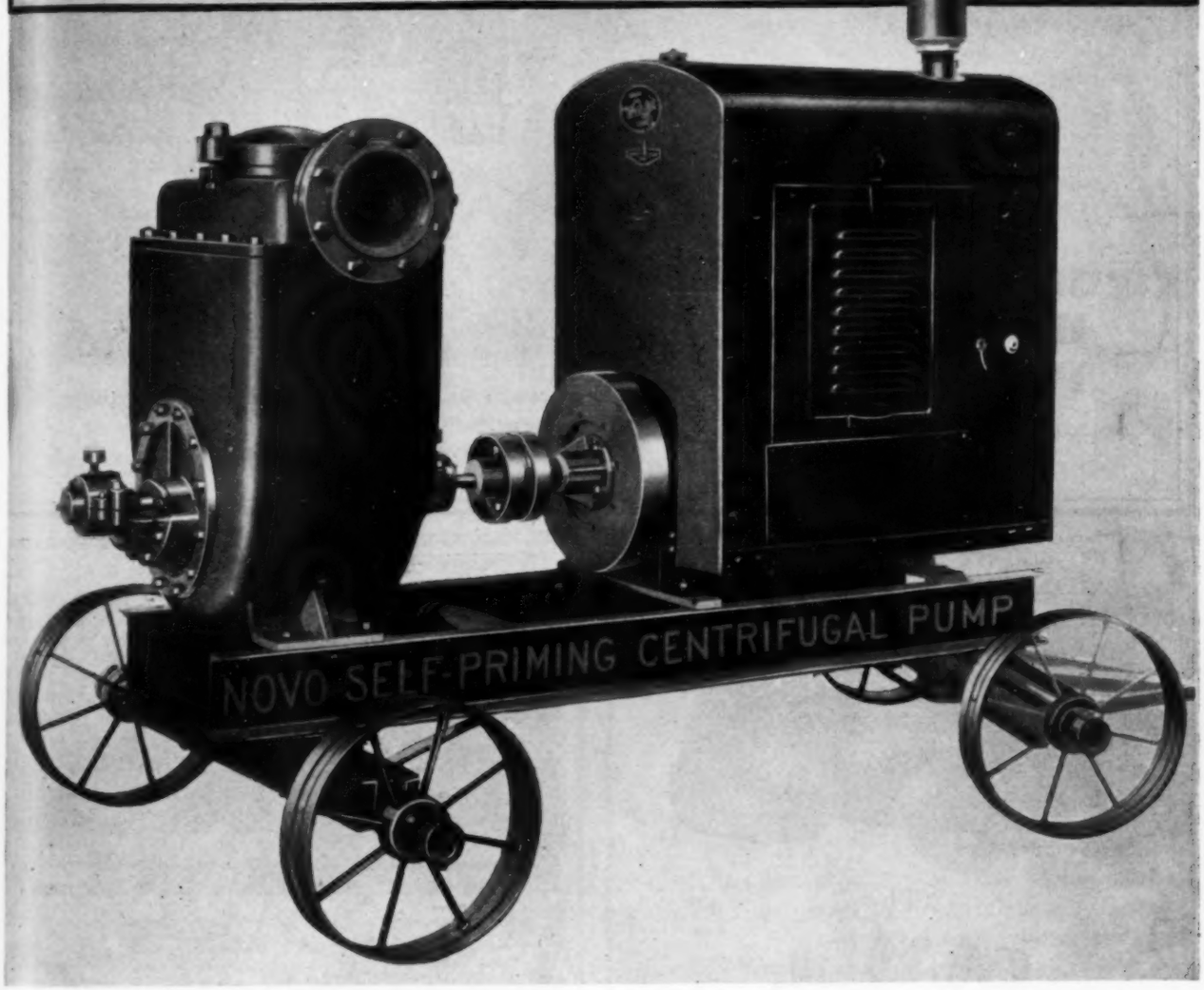
Your Name_____

Address _____

City_____ **State**_____

Contracting Pump Headquarters *Announce*

A REAL SELF-PRIMER



This is Contracting Pump Headquarters' answer to the self-priming, centrifugal pump problem. This anti-friction self-primer really primes itself. It is not built for a market's fancy. It is designed, built and tested to do a very definite job.

Look at the picture. This is a modern, water lifting and moving machine: not a collection of gadgets, air pumps, fancy float chambers, foot valves, etc. It is simple. It is foolproof. It primes itself.

This newest, modern development from Contracting Pump Headquarters is available in three sizes: 3-inch, 4-inch and 6-inch, skid or truck-mounted. All are powered with Novo Rollr Engines, for new smoothness and sureness of operation. Pump impeller shafts mounted on anti-friction bearings.

These are great pumps and your logical, most economical answers to big gallonages without constant priming.

For complete information on Novo Self-Primers send this.

NOVO
CONTRACTING PUMP HEADQUARTERS

NOVO ENGINE COMPANY
CLARENCE E. BEMENT, Vice-President and Gen. Mgr.
214 Porter Street Lansing, Michigan

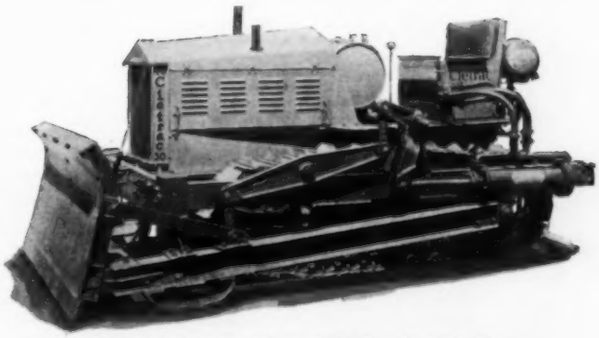
Name.....
Address.....
City..... *State*.....

It's Time to MOVE DIRT

WHETHER its a bulldozer job or one that calls for a Fresno, nothing can speed up the work like Cletrac Crawler power.

Cletrac delivers unusual power for either "push" or "pull". It travels fast and saves time. There's no time out for daily hand oiling. There's less lost motion because of Cletrac's quick action steering and nimble turning. Precision control enables the operator to put blade or scoop right where it's wanted without a lot of maneuvering.

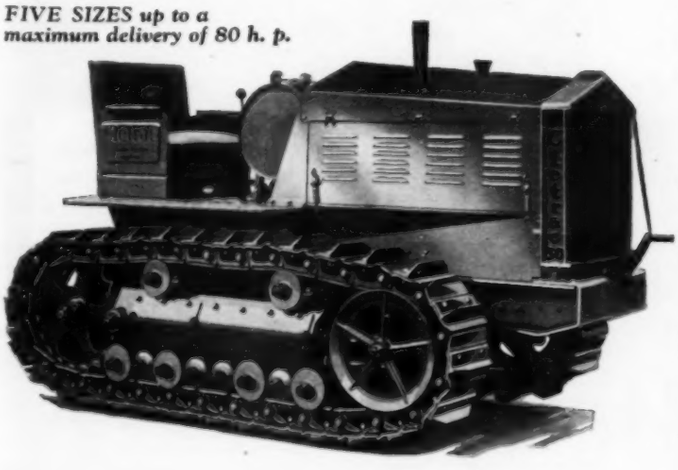
Make your next grading or filling job a faster and cheaper operation by using a Cletrac Crawler.



CLETRAC "40-30" and Hydraulic Bulldozer

The Cletrac "40-30" is an ideal middle-size unit for the average job—or select the Cletrac "15" (15 h. p.) if you want maximum economy on a small contract. Both models are designed and arranged for all standard equipment hook-ups.

FIVE SIZES up to a maximum delivery of 80 h. p.



See the Cletrac dealer or mail the coupon

THE CLEVELAND TRACTOR CO.
19323 Euclid Ave. Cleveland, Ohio

Cletrac Crawler Tractors

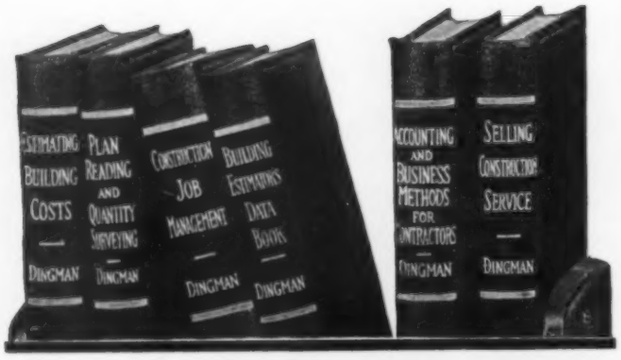
The Cleveland Tractor Co.
19323 Euclid Ave., Cleveland Ohio
Send information on models checked
☐ The "15" ☐ The "20" ☐ The "40-30" ☐ The "40" ☐ The "80-60"

Type of work.....

Name.....

Address.....

.....



Practical facts on every phase of building construction!

HERE is a set of books that is packed to the covers with plans and methods for speeding up production, saving materials and labor, and cutting costs. The six books cover every phase of practical construction work from estimating building costs to the selling of construction service—from plan reading and quantity surveying to practical job management. With these books, the contractor and construction superintendent can make costs come down and profits go up!

The Dingman Building Contractors' Library

The Dingman books have won a wide reputation among builders and building contractors for their sound, practical and easy-to-understand discussion of building construction work. All of the material has been drawn from actual practice.

This library is intended for

[1] The building contractor who wants a handy reference set that will give him almost instantly a ready answer to most of the problems that come up in the course of the day's work.

[2] The young men in the building industry who intend to make the business of construction their life work, and who want the kind of guidance that will aid them to climb to the top.

Six Volumes, 1140 Pages, Pocket Size, Fully Illustrated

Each one of the volumes in this set is a complete handbook on some important subject. Sturdily bound and pocket size, it will go right "on the job" with you for immediate consultation.

Practical data is given on analyzing a construction job into its component parts—estimating the costs of labor, haulage, equipment, materials, etc.—plan reading and determining quantities from specifications—personnel management—successful supervision of every building operation—efficient and economical business methods—office procedure such as accounting, banking, purchasing, etc.—advertising and selling methods for contracting service—and a complete data book of tables, forms and calculations most frequently used by the builder.

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Every contractor and builder, every architect and engineer, every student and executive, who is seeking practical help on the everyday problems connected with building construction work should have this valuable reference library.

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You may send me for 10 days' free examination, the new six-volume Dingman BUILDING CONTRACTORS' LIBRARY. I agree either to return the books at the end of 10 days or send a first payment of $1.50 then and $2.00 a month for six months.

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PORTABLE TIMBER SAWING MACHINE

Men slow up as the day progresses, but at 3 P. M. you find the Timber Wolf Portable Sawing Machine cutting through timbers at the same high rate of speed as at 9 o'clock in the morning—a powerful, tireless machine that enables 2 men to do the work of 8 or 10.

Built with A.C. or D.C. drive, or with Compressed Air for underwater work. Learn why leading contractors and railroad and city construction men are staunch backers of the Timber Wolf—write.

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Toledo Torch

Prevents Accidents

always there-always lit-always seen

Insist on the *genuine* Toledo Torch. No other safety light is so effective. Unbreakable, self-righting, stormproof, economical. Order through your dealer.

USE THE TOLEDO TORCH FOR OTHER SIGNAL SAFETY

The Toledo Pressed Steel Co.
TOLEDO OHIO

Save with Steel

Manufacturers of The Toledo Horse—the ideal highway barricade

The twenty-year-old Warrington-Vulcan driving the batter piles on the Rogue River job.

Bird's-eye View of the Rogue River Bridge Work, one mile above the mouth of the river. Mercer-Fraser Company, Contractors, Eureka, Calif.

Bought in 1910 and still doing a superior job

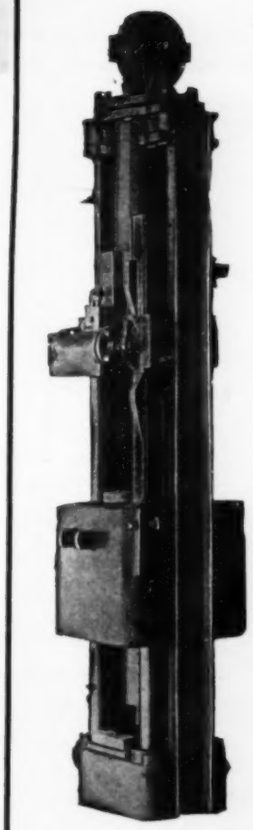
"We are using a No. 1 Vulcan Steam Hammer, which we bought from you under date of March 18, 1910, No. 567."

There is a wealth of meaning behind the few words quoted above. Here is a Warrington-Vulcan over twenty years old, giving excellent service on this Rogue River Bridge job.

But this is not an unusual case. No Vulcan Hammer has ever entirely worn out. They are as staunchly built as they are correctly engineered.

The Warrington-Vulcan is the Pile Hammer with the true punching action. Incorporating the exactly correct driving principle, it sinks piling faster without damaging the pile heads. And with less wear and tear on the Hammer itself.

Warrington-Vulcans are low in first cost and in upkeep.



The Warrington - Vulcan Hammer is built in a number of sizes of which the weights of the ram or striking parts are as follows: No. 0, 7500 lbs.; No. 1, 5000 lbs.; No. 2, 3000 lbs.; No. 3, 1800 lbs.; No. 4, 550 lbs.

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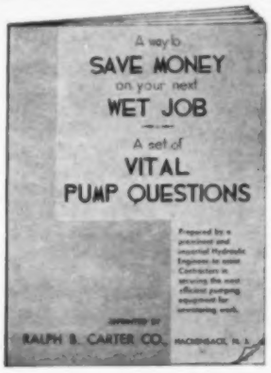
Warrington-Vulcan

A HUMDINGER Answer to every Pump Problem



Whether it is open excavation, well-point, sewage, pier hole or trench, this little booklet will save you many pump dollars on your next contract.

SEND FOR IT TO-DAY

Use this coupon

RALPH B. CARTER CO.
192 Atlantic St., Hackensack, N. J.

Please send me booklet **"A Way to Save Money on Your Next Wet Job."**

Name .....

Address .....

City ..... State .....

A Sensational Performer and Money Saver

THE speed, versatility, rugged construction, big yardage and low cost of the Fundom combination shovel, ditcher and crane, make it a sensational performer and money saver.

It makes small jobs profitable. Fast, full ¾ circle swing, 1/3 yard dipper capacity, 16½ foot radius, gasoline power.

With Trench Hoe attachment for ditching or Boom Extension for clamshell, dragline or crane, the Fundom is an unbeatable three-in-one digging machine.

Get the details and name of nearest dealer. Address—

The Fundom Hoist & Shovel Co.
407 American Bank Building, Lima, Ohio

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Helps The Contractor

A NATION WIDE SERVICE
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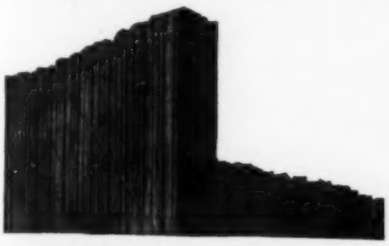
STEEL SHEET PILING

NEW AND USED



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C.M.

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offers a complete line of used, rebuilt, reconditioned shovels and cranes at bargain prices. Ask for details on make and size interested in.

VERLOOK MACHINERY SALES
2502-I East Erie Avenue, Lorain, Ohio

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the *Searchlight Section*
for
Equipment Opportunities

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MOST ECONOMICAL SECTIONS ROLLED

1 **RENTAL**—On this basis, Foster furnishes piling for temporary use for any period of time. Agreement accommodates lessor's requirements and encourages this economical method of securing piling. No deposit required. Rental figures are surprisingly low.

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3 **OUTRIGHT SALE**—Foster offers new piling for immediate shipment on outright sale, when desired. Where used piling may be employed to advantage on permanent work, Foster is able to supply requirements at prices that stimulate buyers' preference. The purchase of Foster's guaranteed used piling, therefore, makes it possible for many to effect tremendous savings in piling work.

GUARANTEE—Every length of piling leased, bought on sale with re-purchase agreement, or bought outright from Foster is subject to your approval at destination; should your inspection disclose a single unsatisfactory length, replacement will be made at our expense.

Any Quantity Suitable Lengths
Prompt Shipment from Convenient Points

All piling sections furnished by Foster have the universal interlock of three line contact shown.

Interlocks afford water-tightness, and strength, and ample clearance for free driving and pulling.

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A Business Opportunity

$5,000 to $10,000 a year—and upwards to $20,000 or more, can be made of a business opportunity that exists in your territory—a place where some far-sighted, peppy, energetic young man is going to step in—and build a small capital into a very profitable business—and where he can capitalize on his present knowledge of the Construction Industry, without competing with it. If you think you are the man in your territory to make this money—write for details, today.

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Where Have My Profits Gone?

The answer to this question is frequently found in a list of the idle equipment you have on hand—equipment you will never use again. Turn this into CASH before the junk pile claims it.

Contractors and others may now be looking for just what you have. Let the field know what you have to SELL.

You can reach thousands of prospective buyers of good used construction equipment through a "Searchlight" advertisement.

Act Immediately and Turn This Idle Equipment into Cash

For advertising rates and information address
SEARCHLIGHT DEPARTMENT, Tenth Ave. at 36th St., New York

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Use GELEX

to reduce your blasting costs

Gelex No. 1 • Gelex No. 2 • Gelex A

These du Pont dynamites have already reduced blasting costs in mining iron, lead, zinc, molybdenum, limestone, gypsum and clay.

In quarrying limestone, granite and trap rock.

In excavating for railroad and bridge construction.

And in driving railroad and sewer tunnels.

DYNAMITES of the Gelex type are designed expressly to decrease the cost of blasting in work that has been done heretofore with ammonia gelatin ranging from 35 to 60 per cent strength or with 40 to 60 per cent high-density ammonia dynamite.

They will not give as good results as these older explosives in every operation—much depends upon local conditions—but Gelex has lowered costs in many operations.

Gelex No. 1 and Gelex No. 2 stand between low-density ammonia dynamite and gelatin dynamite—more cohesive and much more water-resisting than ammonia dynamite but bulkier than gelatin. Gelex No. 1 averages 105 cartridges, 1¼ by 8 inches, to the 50-pound case; Gelex No. 2 averages 120 cartridges. No. 1 has a bulk, or cartridge, strength of 60 per cent; No. 2 of 45 per cent. Both are adapted for underground as well as open work.

Gelex No. 1 has thus far found its chief usefulness in well-drill holes in limestone quarries.

Gelex No. 2 has been most successful as top load in well-drill holes in quarrying; as entire load in well-drill holes for excavating shale; in smaller diameter holes in bench or low face limestone and gypsum quarries; and in limestone, gypsum, clay, lead, zinc and iron mines.

Gelex A has much the same characteristics as 60 per cent ammonia gelatin but is of slightly lower velocity and lower density, averaging 99 cartridges, 1¼ by 8 inches, to the 50-pound case. It is plastic and water-resisting and gives off a relatively small volume of harmful fumes. Gelex A has proved an efficient substitute for 60 per cent ammonia gelatin for blasting limestone, granite and trap rock; in quarrying and in excavating for construction work; for driving tunnels in sandstone and limestone; and for mining iron ore. At present this explosive is offered for sale only east of the Rocky Mountains.

If you think Gelex is adapted to your mining, quarrying or contracting requirements, tell us the conditions. Our extensive experiences may enable us to apply Gelex as a means to solve your problems.

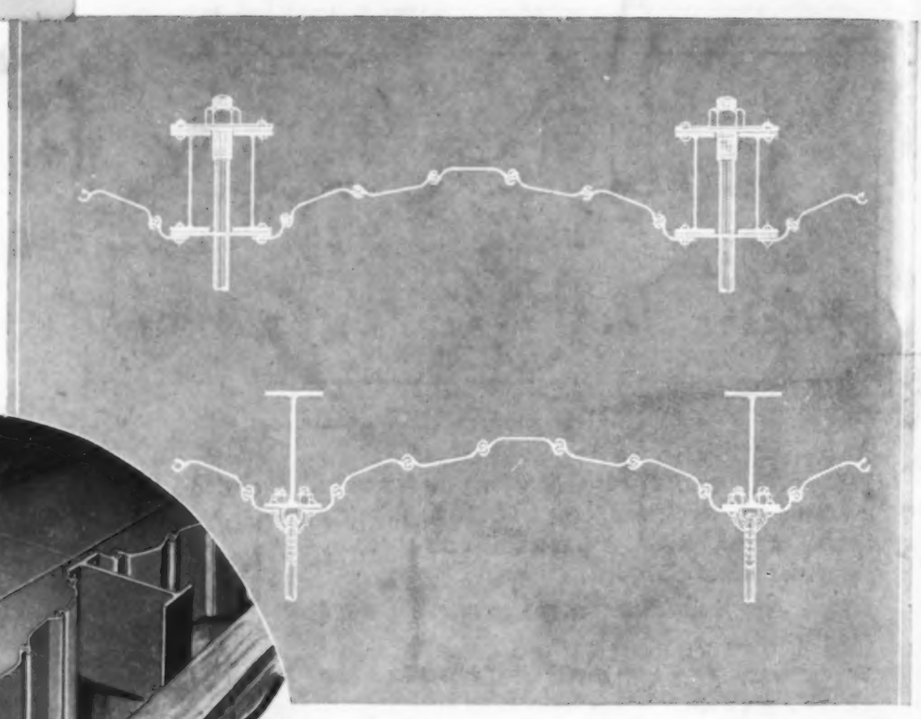
DU PONT

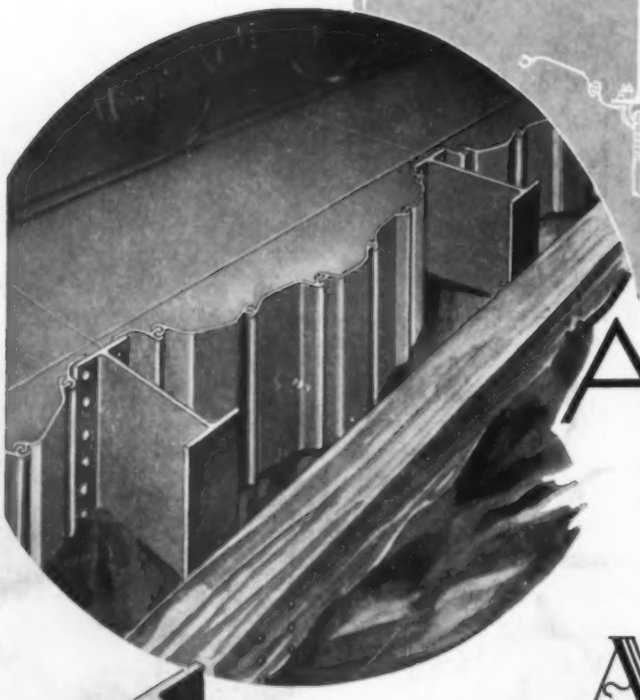
REG. U. S. PAT. OFF.

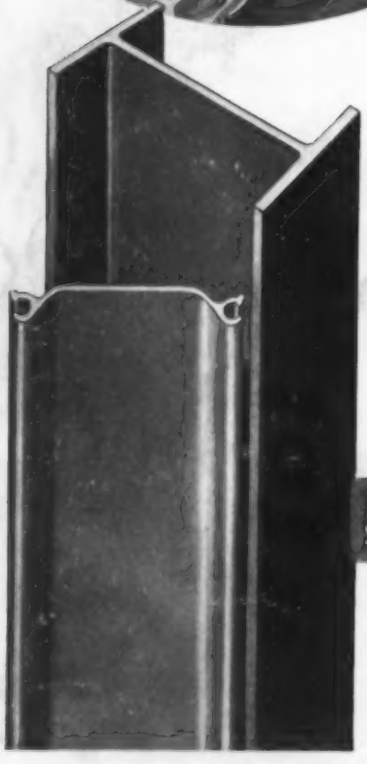
E. I. DU PONT DE NEMOURS & CO., INC.

Explosives Department

WILMINGTON, DELAWARE







A *Steel* Wharf

for any depth of channel and any surcharge load

A PARTICULARLY efficient and economical type of wharf and bulkhead construction is illustrated herewith. By varying the weight of the C B Sections and the spacing of the master piles, a wharf of any desired bending strength or any depth of channel can be constructed. An anchor rod is used for each master pile. No waling is necessary, as the piling, driven in the form of an arc, is entirely in tension.

This type of construction, incorporating C B Sections and Carnegie Steel Sheet Piling . . Section M 107 . . was successfully used for wharf at Gravesend Bay, New York, and more recently at Panama City. A new job at Alpena, Michigan, now under construction, incorporates a double master pile as shown at top of illustration. Carnegie Engineers are at your service at all times.

CARNEGIE STEEL COMPANY · PITTSBURGH

Subsidiary of United States Steel Corporation

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CARNEGIE

STEEL SHEET PILING